THE PAPER INDUSTRY and PAPER WORLD

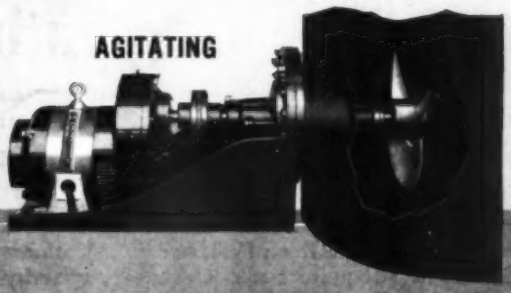
AN EDUCATIONAL NEWS MAGAZINE – OCTOBER, 1942

GRINDING

PATTERSON MACHINERY

"A Vital Part of the Picture in Paper"

MIXING



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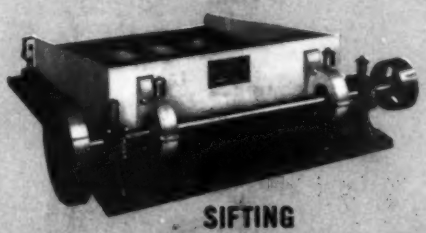


SIFTING

Dependable performance keeps bright the Patterson name in the paper industry.
Our cooperation in solving new problems is always at your command.

Richard L. Cummings
President

THE PATTERSON FOUNDRY & MACHINE CO.

6 Simple Rules

for keeping Seybold Paper Cutting Machines in good operating condition.....

Here are six simple rules followed regularly by an efficient operator of a Seybold Paper Cutting Machine:

1. **Keep It Clean!** Make it a daily habit to remove all surface dust and dirt from the machine.
2. **Keep It Lubricated!** Before lubricating, make sure that oil holes and cups are free of dirt and grit. Use *clean* lubricants in adequate but not excessive quantity. "Flooding" with oil or grease is not only wasteful but may prove harmful.
3. **Inspect Cutting Knife!** If the plant is not equipped with a Seybold Knife Grinding Machine, it is good insurance to have the knives inspected *regularly* by a local trade knife grinding shop.
4. **Inspect Clamp Pressure Mechanism.** On cutters equipped with clamp pressure indicator, the operator turns a ratchet nut and the indicator tells whether the clamping pressure will be *high, medium,* or *low.* The *medium* setting will hold the average work firmly. Failure to maintain correct clamping pressure on an automatic cutter can cause breakage of parts.
5. **Inspect Driving Clutch and Brake** regularly and maintain proper adjustment at all times. Maladjustments of these important mechanisms not only cause needless wear but excessive power is required to run the machine.
6. **Check Table** regularly for accurate alinement and inspect back gauge to make sure it is parallel with the cutting knife.

* * *

Observance of those six simple rules will not only protect Seybold Cutters from needless wear but will go far to maintain their original high standards of performance. Call your SEYBOLD REPRESENTATIVE when you require his cooperation on repair or maintenance service.

Tech

SEYBOLD

SEYBOLD SALES AND SERVICE

New York:
E. P. LAWSON CO., INC.
426 West 33rd Street

Chicago:
CHAS. N. STEVENS CO., INC.
112 West Harrison Street

Southern Sales District: **HARRIS-SEYBOLD-POTTER CO.,** 220 Luckie St., N.W., Atlanta, Ga.

West Coast Distributor: **HARRY W. BRINTNALL COMPANY,** San Francisco, Los Angeles, Seattle

Canadian Distributor: **HARRIS-SEYBOLD-POTTER (CANADA) LTD.,** Toronto and Montreal

PARTNERS IN PAPER MAKING . . .

When a customer builds a whole mill around a Beloit paper machine, he must have faith in the machine-builder's integrity and workmanship. Obviously, a machine weighing a million pounds and specifically engineered to fill a specific need cannot be tested in a laboratory before installation. So, in a sense, Beloit and its customers "pioneer" together—and are partners together—through a long lifetime. More than anything else, we value the confidence placed in us by the friends we serve.

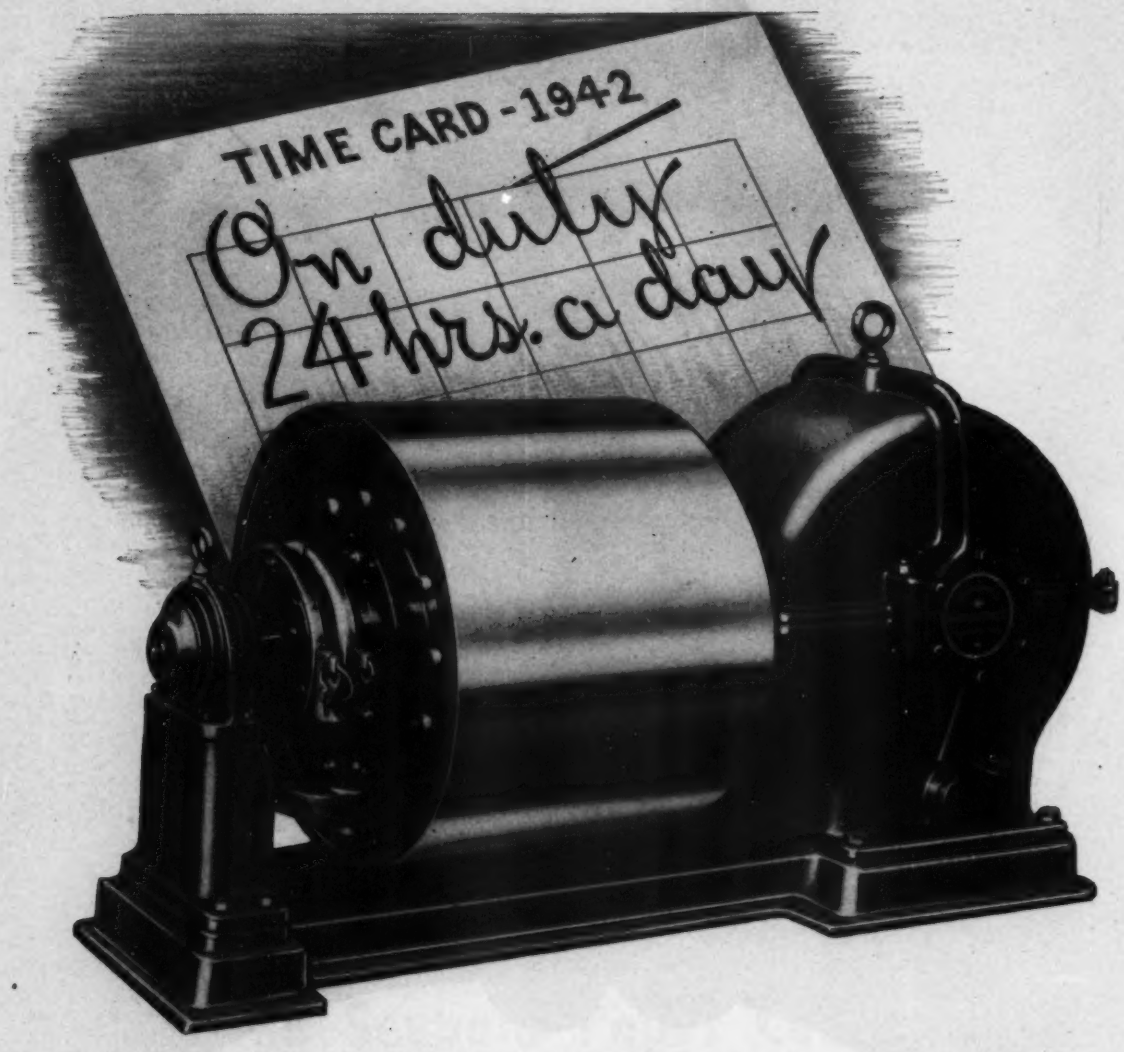
SERVING UNCLE SAM 1ST FOR THE DURATION

BELOIT

WHEN YOU BUY BELOIT . . .

YOU BUY MORE THAN A MACHINE!

BELOIT IRON WORKS, BELOIT, WIS.



Hypoid and Spiral Bevel Gear Drives

The design and construction of these modern spiral bevel and hypoid gear drives provide for extremely low maintenance cost, and make possible a steadier running paper machine. Accurately cut Spiral Bevel or Hypoid gears, mounted on shafts supported by anti-friction bearings, deliver a steady, positive power with a minimum of power loss due to friction and improperly operating gears. The enclosed cases provide for the gears to operate in a continuous oil bath. In addition thereto, a positive forced-feed oil pump further assures proper lubrication to all required points, regardless of the speed at which the drive is operating. Our engineer will be glad to assist you in working out a definite maintenance program designed to prolong the life of your existing driving equipment.

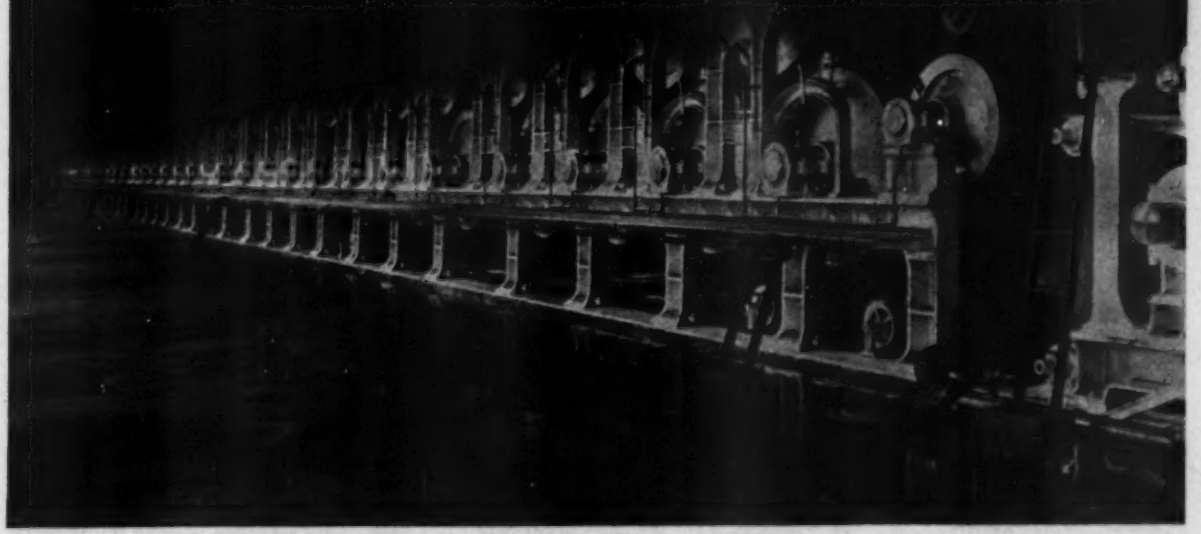
★ ★ ★ ★ ★ ★

THE BAGLEY & SEWALL COMPANY

WATERTOWN NEW YORK

Full Protection

FOR THOSE HARD-TO-REPLACE BEARINGS



IN SCORES of modern paper machines, freedom from sludging and clogged oil lines are definite money saving results of using *Texaco Ursa Oils.*

TODAY, with dryer roll bearings almost impossible to replace, positive protection against clogged oil lines and overheating is vital. You can give your bearings this "life insuring" protection . . . by using *Texaco Ursa Oil.*

Texaco Ursa Oils resist sludging and breakdown under high temperatures and heavy pressures. They keep oil lines clear, assuring the free flow of clean, cool lubricant to every bearing. They are easy to filter or reclaim.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred by prominent pulp and paper mills everywhere.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write to:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

TUNE IN FRED ALLEN
every Sunday night—CBS

TEXACO Lubricants and Fuels

FOR THE PAPER INDUSTRY

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

SODA ASH
—an unseen power behind America's offensive!

JEEPS WITH GLASS EYES. Jeeps are rolling off U. S. production lines by the thousands. Headlamps and bulletproof windshields are products of the glass maker. Largest single user of soda ash, the glass industry is also turning out greatly increased quantities of glass containers. This releases vital tin and steel for war production.

THE BEST-DRESSED ARMY IN THE WORLD—Wherever it goes—into the steaming jungles of the southwest Pacific or to the freezing shores of Iceland—the American army is clothed in the finest uniforms to be found on any battlefront. In processing millions of yards of cotton, rayon and woolen cloth for U. S. military uniforms, the textile industry uses thousands of tons of soda ash.

SHELLS FOR HARD-HITTING 75's move along conveyor belts to stapling machines where they are sealed in cartons for shipment. Ordnance plants alone use 30,000 tons of paper every month for packaging shells. A major consumer of soda ash, the paper industry also supplies steel mills with 5,000 tons of kraft paper a month to interleave armor plate and cold rolled steel.

DEPTH BOMBS ASTERN! Nazi U-boat commanders have learned to beware of the rear end of U. S. destroyers. Their depth charges carry a sting that can rip a submarine wide open. A prime processing agent in the manufacture of "TNT" and other high-explosives, soda ash is helping America carry the offensive to the enemy.

AN AMERICAN GIANT THE ENEMY FEARS. The U. S. iron and steel industry produces a greater tonnage of metal than all the Axis countries combined. In iron foundries and steel mills, soda ash plays an important role in the production of more and better iron and steel castings.

OVER THE U-BOATS AND ENEMY ROADBLOCKS huge transport planes will ferry tomorrow's lend-lease materials to distant allies hemmed in by fire and steel. In the production of aluminum, from which these cargo planes are being fabricated, soda ash is an important processing agent. It is used to treat the bauxite ore from which pure aluminum is derived.

MATHIESON CHEMICALS

THE MATHIESON ALKALI WORKS, INC.

60 E. 42ND STREET, NEW YORK, N. Y.

LIQUID CHLORINE...SODA ASH...CAUSTIC SODA...BICARBONATE OF SODA...BLEACHING POWDER...HTH PRODUCTS...AMMONIA, ANHYDROUS and AQUA...FUSED ALKALI PRODUCTS ...SYNTHETIC SALT CAKE...DRY ICE...CARBONIC GAS...SODIUM CHLORITE PRODUCTS

THE PAPER INDUSTRY
and PAPER WORLD

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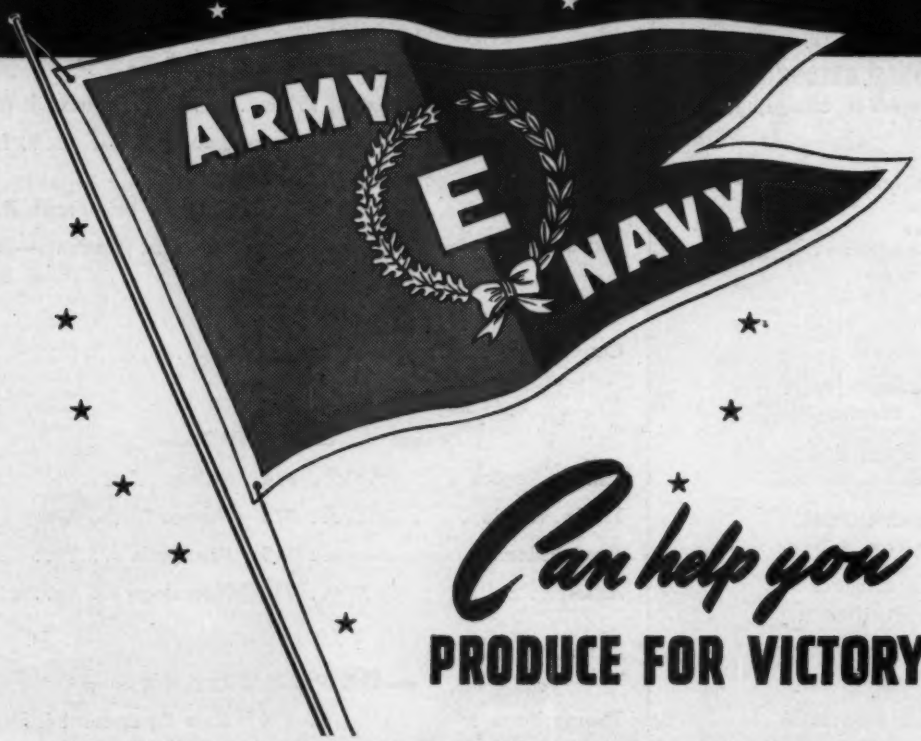
THE PRECISION MANUFACTURING AND EFFICIENCY THAT HAVE EARNED THE...



Can help you PRODUCE FOR VICTORY

Naturally, Bowser is proud to be among the very first to receive the coveted Army-Navy "E" Award for the production of war goods. And, doubly proud that it can still produce the equipment that other industries find so necessary in doing their part in this War of Production. To help industry, Bowser makes lubricating systems and devices to keep machines running—meters to measure and conserve liquids—filters for many liquids—filtration systems for cutting, grinding, lubricating and honing oils and coolant solutions—pumps—wheel tanks—stills for reclaiming cleaning solvents—fueling systems for airplanes and trains—and many others. To handle liquids right—WRITE Bowser!

BOWSER

S. F. BOWSER & COMPANY, INC.

FORT WAYNE, INDIANA

Old rubber belts made into new

Save rubber — save money; don't throw away any rubber transmission or conveyor belting until you investigate

Worn belt ready to junk. Don't do it!

Slitting old belt into 2 narrower belts.

Ripping off worn pulley ply.

Preparing for Plylock Splice. Damaged spots can be patched, ready for vulcanizing.

Vulcanizing repairs or making belts endless by Plylock method.

Two belts almost good as new — for a few dollars.

Another B. F. Goodrich suggestion to save rubber

It's as easy and simple as that! B. F. Goodrich distributors are helping to conserve vital rubber by making new belts from old. If edges are worn, they are trimmed, and the old belt slit into two or more narrower widths for other drives. If top or bottom is worn, it is peeled off to the good plies underneath. If it is a conveyor belt and original width must be maintained, cuts and tears on the edges can be repaired.

Then vulcanized repairs are made and the new belts may be made endless (on the drive itself if you wish) by the Plylock Splice. A vulcanized repair is a *permanent* repair. It will last as long as the belt.

In this way months and even years of service are being saved from belts that had been headed for the junk pile. If you have any old, worn belts in your plant, call in your B. F. Goodrich distributor or write us for full details. Also write us for free copies of a series of folders on how to conserve all industrial rubber products you use; if you use conveyor belts we will also send you a Belt Maintenance Manual full of helpful information on making conveyor belts last longer. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich

FIRST IN RUBBER

KENWOOD WOOL PRODUCTS

F. C. HUYCK & SONS

Established 1870

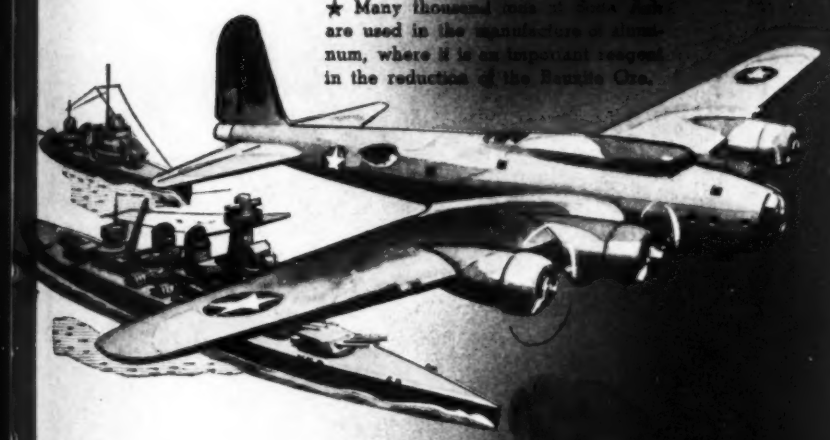
KENWOOD MILLS · ALBANY, N. Y.

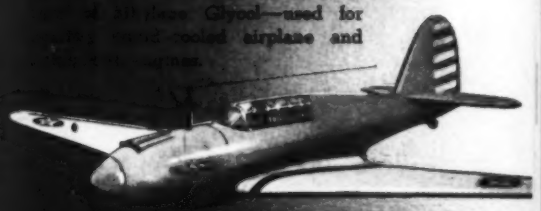
DIAMOND PRODUCTS

GO TO WAR

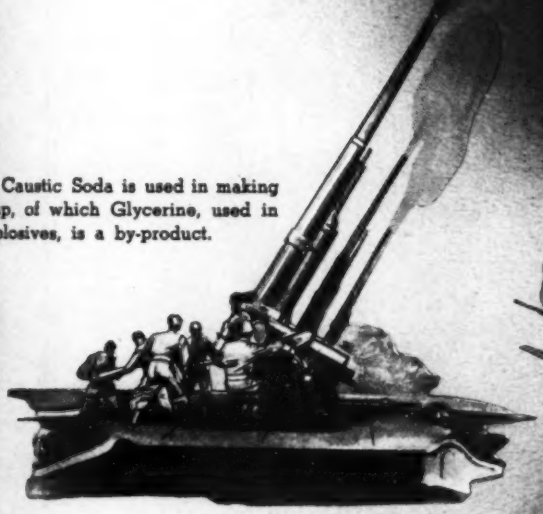
★ For every pound of rayon made by the viscose method, approximately one pound of Caustic Soda is used.

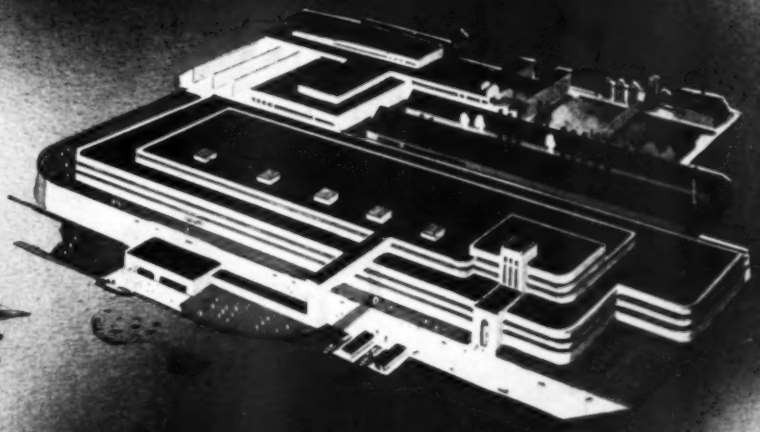
★ Many thousand tons of Soda Ash are used in the manufacture of aluminum, where it is an important reagent in the reduction of the Bauxite Ore.





★ Caustic Soda is used in making soap, of which Glycerine, used in explosives, is a by-product.





★ The manufacture of TNT used in bombs and shells requires Soda Ash in one step of the process.

Peacetime [illegible] for Diamond Alkalies give way to War Requirements . . .

Today the war effort comes first with Diamond, as it does with you. Shown here are a few of the intensified, war-inspired applications for Diamond products that must be satisfied before civilian uses can be served.

When every ounce of effort is devoted to the one job of winning the war, maximum production must be maintained without sacrificing quality. Diamond is meeting this challenge!

ALKALI

DIAMOND ALKALI CO., PITTSBURGH, PA., *and Everywhere*

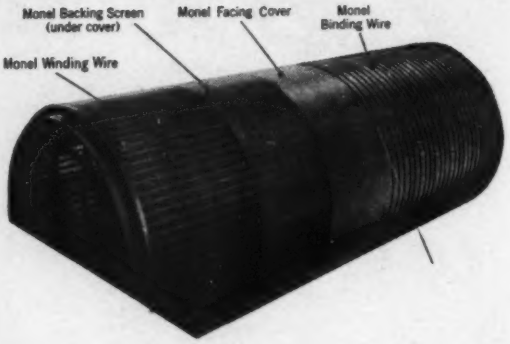
NOTES ON CONSERVATION OF CRITICAL MATERIALS . . . No. 4

Mill operating men should zealously watch the covers of thickeners, washers, cylinders, dandy rolls and filters . . . especially those made from Monel, Nickel and other corrosion-resisting materials essential to war production.

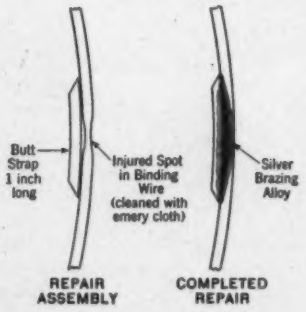
The 'binding' and 'winding' wires of these covers should be scrutinized particularly. Their failure can cause destruction of *irreplaceable* wire cloth covers.

Injured and broken Monel binding and winding wires can be conserved by repair. Several recommended methods are described below. For full information on joining Monel, write for Bulletin T-2, "Welding, Brazing and Soft Soldering of Monel, Nickel and Inconel."

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York, N.Y.



METHODS FOR JOINING MONEL BINDING AND WINDING WIRES


Butt Strap 1 inch long
Injured Spot in Binding Wire (cleaned with emery cloth)
Silver Brazing Alloy
REPAIR ASSEMBLY
COMPLETED REPAIR

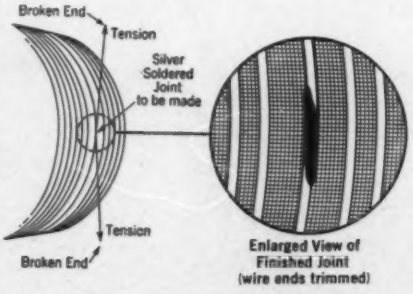
Case A: Prevention of break of an injured winding wire on cylinder or drum.

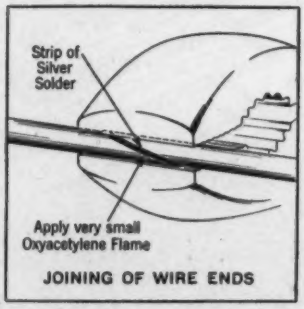
1. Clean wire with emery cloth an inch on each side of injured spot.
2. Cut a one inch long butt strap from a wire of same or slightly smaller diameter and bevel the ends.
3. Lay butt strap alongside cleaned injured spot of wire. Apply silver solder flux such as "Handy Flux."
4. Silver solder with 1/32 inch or 1/16 inch diameter "Easy-Flo Brazing Alloy" wire which flows at 1150° F. *Use a very small oxyacetylene flame.*

Case B: A broken binding wire to be joined on cylinder or drum.

Repair of broken binding wire by this method involves removal of one turn of the binding (see sketch).

1. Clean wires to be joined with emery cloth for two inches at point of contact.
2. Pull ends of binding wire taut and silver solder wire contact area as recommended above.





Case C: Joining of broken winding wire (cover removed).

1. Clean broken ends with emery cloth an inch on each side of the break.
2. File a 30° bevel on ends to be joined.
3. Silver solder beveled lap joint as shown in illustration. Rewind repaired wire.

★ ★ ★ ★ ★ **INCO NICKEL ALLOYS** ★ ★ ★ ★ ★

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • "Z" NICKEL • NICKEL

Sheet . . . Strip . . . Rod . . . Tubing . . . Wire . . . Castings

BAKER TRUCKS can help you to increase plant capacity

Here's how —

1. TIERING IN WAREHOUSES

By storing two and three high (or higher) more floor space can be released for production.

2. KEEPING MATERIALS MOVING

Man and machine time can be conserved by having material at hand when and where needed.

3. YARD STORAGE AND HANDLING

Bulky equipment and material need not occupy valuable inside floor space where Baker Trucks are in service.

4. USING REMOTE SPACE

Baker Trucks reduce distance within the plant, and make practical the use of remote areas.

5. KEEPING MACHINES RUNNING

Servicing machines, die changing and millwright work done with BAKER TRUCKS reduces idle machine time.

The BAKER material handling engineer can help you

He is a specialist, and knows how to get the most out of material handling to speed plant production. He is at your service.

BAKER INDUSTRIAL TRUCK DIVISION *of the Baker Raulang Co.*

2169 West 25th Street • Cleveland, Ohio

Observe Fire Prevention Week, October 4-10

Baker INDUSTRIAL TRUCKS

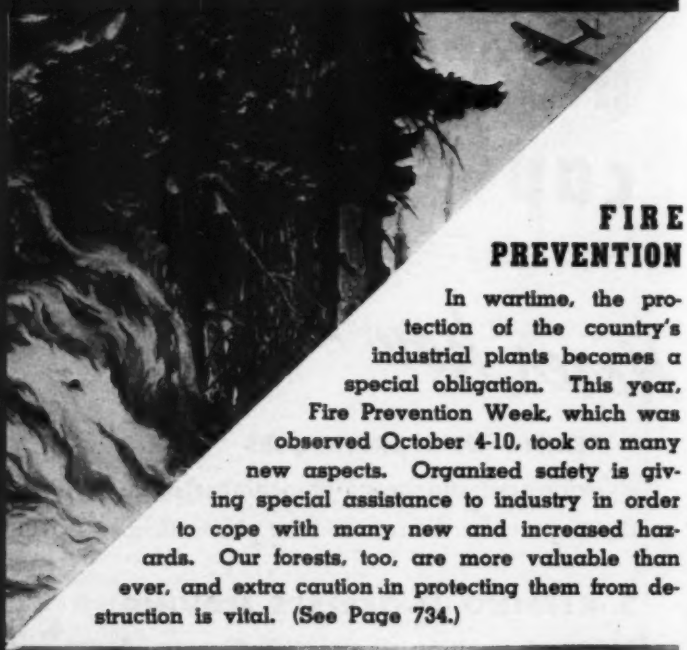
In Canada: Railway and Power Engineering Corporation, Ltd.

TIMELY TOPICS

"the old gent and myself"

The Nation needs every man who has any skill or latent talent, regardless of age. Men of experience are being drawn into the war effort; they are needed now in practically every industry. The only two-man Labor-Management Production Drive Committee in the United States consisting of "the old gent and myself" has won recognition and the flag it sought via the White House. **(See Page 679.)**

OWI Photo



FIRE PREVENTION

In wartime, the protection of the country's industrial plants becomes a special obligation. This year, Fire Prevention Week, which was observed October 4-10, took on many new aspects. Organized safety is giving special assistance to industry in order to cope with many new and increased hazards. Our forests, too, are more valuable than ever, and extra caution in protecting them from destruction is vital. **(See Page 734.)**

TRANSPORTATION—Termed "the largest industry Traffic Committee meeting on record" the Paper Industry Traffic Group met and discussed the importance of determining standards for the industry's strict observance of the Maximum Car Loading Order of the Office of Defense Transportation, which becomes effective October 15. Suggestions are solicited. **(See Page 680.)**

SALVAGE—The people of this country have made a great discovery—they have found that a great deal of real wealth has been thrown away; much of it long hidden in odd places or buried in junk piles. Unused and obsolete machinery, tools, and equipment are now solicited by the Conservation Division of the WPB, and this Division started a nation-wide "dormant scrap drive" on October 1. More than 3,000 trained field men, loaned by private industry to assist the Conservation Division, will call on industrial plants throughout the country to stimulate the scrap program. **(See Page 676).**

● An inestimable amount of useful metal was salvaged during the Paper Industry's Koast-to-Koast Key Kollection Kampaign. This movement was scheduled for September 17 to October 1, but so many keys came out of hiding it was extended to October 15. The salvage of these old keys has brought to light much of human interest; there are enough amusing incidents and mystery to support that old saying that "truth is stranger than fiction."

TRADE WINDS

PAPER INDUSTRY AWARDEES PROMINENT IN LINCOLN FOUNDATION STUDY

▸▸▸ PULP AND PAPER MEN figured prominently in the awards just announced in the nation-wide 2½-year $200,000 scientific welding study program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

The 2½-year welding study, known as the "$200,000 Industrial Progress Award Program," brought forth reports of welding progress prepared by executives, engineers, designers, architects, production officials, and others throughout the industrial field. The study indicated a possibility of tremendous savings in costs and man hours for production of products by arc welding for both war and peace.

Reports of arc welding progress in production of war equipment, including ships, tanks, planes, guns, etc., featured prominently in the awards. There was a total of 408 awards going to 458 participants representing every conceivable division of industry.

Among the Pulp and Paper Awards in the Industrial Progress Award Program, sponsored by The James F. Lincoln Arc Welding Foundation, were (L to R): R. S. Conabee, Lukenweld, Inc.; Joe Baxter, Jr., Shartle Brothers Machine Co.; and Francis A. Helin, Bagley and Sewall Company.

Principal Pulp and Paper Awards

In the pulp and paper industry, amounts of the chief awards, the names, subjects, and connections of awardees are as folows:

R. S. Conabee, engineer, Lukenweld, Inc., Coatesville, Pennsylvania. Award—$1,700. Subject matter: A lightweight (facial) paper machine and processing. A welded open "C" supporting framework with "kickout" blocks permitted easy replacement of Fourdrinier wire. In welded design, suction boxes become integral with beam section of framework. Steam drying drum formed from separate steel sheets welded together. Savings up to 77 and 130 per cent suggested.

Joe Baxter, Jr., sales engineer, Shartle Brothers Machine Company, Middletown, Ohio. Award—$250. Subject matter: Arc welding as a development tool—applied to waxing machine. The design was stimulated by a customer who wanted a "prettier" and "faster" machine. Speed of paper through machine increased from the usual 700 feet per minute to from 900 to 1,200 feet per minute. Author emphasizes arc welding as a development tool.

Francis A. Helin, chief designer, Bagley and Sewall Company, Watertown, New York. Award—$250. Subject matter: A new-type steam-heated cylinder for drying materials such as paper, milk, food products, and cloth. The design used the indirect heating method by having an inner radiator element which remains stationary while the roll revolves around it. Radiation and convection currents within the shell are estimated to make the heat transmission as good or better than cast iron construction. No full-size cylinders of this type have been made but cost estimates show that they will be cheaper than cast iron types.

Robert Schliewe, assistant mechanical superintendent, Weyerhaeuser Timber Company, Longview, Washington. Award—$250. Subject matter: The outstanding contribution arc welding is able to make in the maintenance of a saw mill plant. Over 17 items in which welding has been used are described in detail. It is claimed that in this plant a saving of over $25,000 annually results from their use of welding.

Frank K. Zaniker, welding supervisor, Crown Willamette Paper Company, West Linn, Oregon. Award—$100. Subject matter: The replacement of the cast iron lifting tackle for the beaters in paper processing with a steel welded construction. Savings are based on cost of unit and reduced loss of time as a result of failures.

Leopold S. Soenegard, industrial engineer, S & S Corrugated Paper Machinery Company, Inc., Brooklyn, New York. Award—$100. Subject matter: A number of places where arc welding made improvements in design and ultimate savings for a paper machinery manufacturer. The principal gain for this company, when arc welding was adopted, was the release of about 1,200 hours of a large planer.

◆

FINANCIAL

Changes in prices for paper mill securities were mixed during the past month. While the stock markets generally showed an upward turn as a result of the Russian defense of Stalin-

grad, the paper mill securities were influenced to a certain extent by uncertainty as to the effect of any concentration of industry which may be developed by the War Production Board.

Champion Paper & Fibre Company—Net income for the year ending April 26, 1942, was $3,129,986 as against $2,379,660 for the preceding fiscal year.

Crown-Zellerbach Corporation—Net profit for the quarter ending July 31, 1942, was $1,803,147 as compared with $2,309,135 for the same period in 1941.

Escanaba Paper Company—Net income for six months ending June 30, 1942, was $128,181 as compared with $111,416 for the similar period in 1941.

Hinde & Dauch Paper Company—Net profit for six months ending June 30, 1942, was $453,621 as against $432,900 for the same period in 1941.

Hummel-Ross Corporation — Net profit for twelve weeks ending June 13 was $87,110 as against $110,489 for the preceding twelve weeks, and $99,269 for the twelve weeks ending June 14, 1941.

Keyes Fibre Company—Net profit for the first six months of 1942 was $167,022 as against $142,750 for the same period in 1941.

Mead Corporation—Net income for the three 4-week periods ending June 13 was $381,115 as against $404,321 for the comparable period in 1941.

Minnesota & Ontario Paper Company—Net profit for the six months ending June 30, 1942, was $842,910.

Puget Sound Pulp & Timber Company—Net profit for the first six months of 1942 was $437,532 as against $498,208 for the same period in 1941.

Rayonier, Inc.—Net profit for the quarter ending July 31, 1942, was $1,376,441 as against $834,983 for the same quarter in 1941.

Soundview Pulp Company—Net income for six months ending July 31, 1942, was $630,310 as against $1,119,640 for the same period in the preceding year.

United Paperboard Company—Net profit for the fiscal year ending May 30 was $371,375 as against $49,045 for the preceding year.

United Wall Paper Factories—Net income for the fiscal year ending June 30 was $551,002 as against $325,973 for the previous fiscal year.

West Virginia Pulp & Paper Company—Net profit for nine months ending July 31 was $2,314,151 after provision of over three and a half million dollars for taxes, as compared with $3,382,624 for the similar period of the previous fiscal year when tax provision was less than $1,300,000.

Recent dividends declared by paper mills include the following: *Container Corporation of America,* 75 cents per share; *Robert Gair Company,* 30 cents per share on the preferred stock; *Gaylord Container Corporation,* 12½ cents per share; *MacAndrews & Forbes Company,* 30 cents per share on the common stock; *St. Regis Paper Company,* $1.75 per share on the preferred stock; *S. D. Warren Company,* 50 cents per share.

New York Stock Exchange—Stocks

	Closing Prices Sept. 25	Aug. 25
A. P. W. Paper Co.	1¼	*1¼–1⅜
Celotex	6⅛	6½
Same Preferred	68	70
Certain-teed	2⅛	1⅞
Same Preferred	26⅞	26
Champion P. & F. Co.	16½	*15½–16½
Same Preferred	95	*94–96
Container Corp.	13⅞	12
Cont. Diamond	6⅛	*6½–6¾
Crown-Zellerbach	12⅛	11¼
Same Preferred	85½	*82⅞–85
Dixie Vortex	8	*8⅜–9⅜
Same "A"	36½	*36–36½
Robert Gair	1⅜	1⅜
Same Preferred	8¼	*9⅛–9¼
Gaylord Container	9¼	9¾
Same Preferred	50	*49–50
International Paper	9	8⅞
Same Preferred	47½	47⅞
Kimberly-Clark	26½	*25¾–27½
MacAndrews & Forbes	17⅛	*17–18
Masonite	26¾	25¾
Mead Corp.	6¼	6¾
Same Preferred	65	*65–66½
Paraffine Cos.	28¾	*28½–30½
Same Preferred	95	*90–100
Rayonier	8¾	*9⅞–10⅛
Same Preferred	25⅞	26½
Scott Paper	35	34
Same 4½% Pfd.	113⅜	*110½–112
Same 4% Pfd.	110	108½
Sutherland Paper	21½	*21–22
Union Bag & Paper	7¾	8⅜
U. S. Gypsum	53¼	51¼
Same Preferred	173	171

New York Stock Exchange—Bonds

Abitibi 5%	69¾	.....
Celotex 4½%	95	98¼
Certain-teed 5½%	91½	89⅞
Champion P. & F. Co. 4¾%	103½	.....
International Paper 5%	103¼	103⅞
Same 6%	105¼	104¾

New York Curb Exchange—Stocks

Am. Boxboard	.....	.....
Great Northern	27¼	.....
Hummel-Ross	3½	3⅛
St. Regis	1¼	1¼
Taggart	2½	.....
United Wall Paper	1½	1⅜

*Closing Bid and Asked Prices.

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▶▶▶ THE OFFICE OF PRICE ADMINISTRATION has declared war on those who violate price ceilings by debasing qualities and skimping on measurements. Several new sections have been set up in a division established to meet this situation, but no section for paper and paper products has yet been set up.

INDUSTRY ASKED TO SEARCH FOR DORMANT SCRAP

A nation-wide industrial "dormant scrap drive," for which more than 3,000 volunteers have been recruited from industry, was begun on October 1. Operation of the program has been organized by the Industrial Salvage Section, under Hamilton W. Wright, through the regional chiefs of the WPB, and the American Industries Salvage Committee, which is headed by Robert W. Wolcott.

Dormant scrap is defined as obsolete machinery, tools, equipment, dies, jigs, fixtures, incapable of current or future use in the war production effort, and should not be construed to apply to reusable machinery, equipment, dies, etc. Seventy thousand industrial executives will be contacted in this drive, accordingly, top executives of all industrial plants are urged to follow the suggestions given below.

1) Instruct the salvage executive of the plant, together with other necessary officials, to inspect all areas of the plant to determine what salvageable items falling in the above dormant scrap classification can be scrapped.

2) Mark clearly each such item for quick identification and make a list in duplicate, for their own use, in order that plant management may authorize the disposition of each item. Indicate approximate weight opposite every piece of dormant scrap.

3) Arrange immediately to dispose of all dormant scrap.

The Government's grave responsibility to supply American armed forces with ships, guns, airplanes, and tanks, necessitates the adaption of this scrap program.

◆

AQUALIZED PAPER

The wartime search for substitutes to replace priority materials has resulted in the development of Aqualized paper, a product of the Brown Company, New York City, which is being hailed as a substitute for cloth and burlap.

The name "Aqualized" was suggested by the paper's amazing strength when wet, contrary to ordinary papers which tend to lose strength and disintegrate in contact with water. By means of an exclusive process, the individual cellulose fibers in the paper are effectively interlocked and fastened, giving an inherent wet strength all the way through the paper that is independent of any coating or sizing on the surface of the paper. Some types of Aqualized paper are highly absorbent, while others are made to repel water.

TANKS . . . IN PAPER BOXES

(NEWS ITEM: *When a tank is sent abroad, there is sent what amounts to about five more tanks in parts, and these parts—many of them—have to be packed in paperboard boxes.*)

Tank battles all over the world may be won in the paper mills of America . . . For it takes thousands of stout, dependable paperboard boxes to package and ship the repair parts that keep a tank division in action.

In our great new Army, every armored division includes skilled mechanics trained to keep motorized equipment in service. The Paper Industry has an important part to play in giving our men the tools and repair parts they need to maintain the Army's fighting effectiveness.

The packaging for ordnance parts, calling for enormous tonnages of paperboard, is one of the essential jobs of paper mills in the war effort. Any mill striving for increased production from existing machines or seeking an opportunity to repair or replace worn-out or obsolete equipment is assured of the fullest cooperation of Puseyjones engineers.

On modern high-speed Fourdrinier Machines as well as on Cylinder Wet Ends, the Puseyjones Flow-Spreader has proved its ability to increase production with greatly improved sheet characteristics. With this new development, the stock is kept "alive" throughout its flow, avoiding flocculation and maintaining uniform dispersion of fiber.

The Flow-Spreader eliminates entirely the customary flow box with multiple inlets and uneven distribution of the stock flow, insuring a level sheet of uniform weight.

Puseyjones men and production facilities are on war work. In the meantime, we are doing our best to supply replacement parts to keep present equipment operating efficiently.

All orders subject to priority conditions of War Production Board.

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-Making Machinery

Wilmington, Delaware, U.S.A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

PD—25A IS BLUE

INDUSTRY knows this Government form as "Application for Priority Assistance —," one of the examples of paper's part in carrying on the war. The use of paper for Government and business requirements and to replace critical materials makes it a most essential product.

The fact that "PD—25A is Blue" shows how color identifies an important form. In war as in peace, paper dyes are important for efficient handling of forms and messages and speedy transmission of vital communications. Dyes are also important for identifying many essential packages and labels.

The problem of utilizing dyes most effectively is a job for du Pont dyestuffs technicians. The services of those highly trained men are at your disposal to help you get the best results in colored papers and paper products.

E. I. du Pont de Nemours & Company (Inc.), Organic Chemicals Department, Dyestuffs Division, Wilmington, Delaware.

DU PONT DYESTUFFS

DYESTUFFS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

The Nation's Smallest Defense Plant

▶▶▶ TWO MEN, whose ages total 139 years, form the only two-man Labor-Management Production Drive Committee in the United States. This committee has won the recognition of the White House.

In Bay City, Michigan, this Labor-Management Production Drive Committee works long hours, seven days a week, turning out flanges, all of which are used on wooden pipes that are installed in large defense plants, thereby saving steel.

Jake Sparling, head man of this tiny unit of America's giant production machinery, is 60 years of age, while his assistant Percy Fogelsonger, a former lumberjack and log roller, is 79 years of age.

Mr. Sparling is a machinist. He worked in his father's planing mill as a youth, and at 20 he was building sugar plants, mills, machine shops, and waterworks plants in northern Michigan and adjoining states. In 1922, due to business reverses and accumulated debts, he found himself with a small shop which he ran without help, making pulleys and doing odd jobs repairing machines.

Last year, before Pearl Harbor, Mr. Sparling wrote to the President asking how he could help with defense. The President turned the inquiry over to William Knudsen, Chairman of the Council of National Defense, who answered the letter, suggesting that Mr. Sparling see if he could not do some work for the Michigan Pipe Company in Bay City. That company needed a lot of flanges, and Mr. Sparling started supplying them. Mr. Fogelsonger had the habit of spending time in the shop anyway, so he was glad to go to work and soon learned to operate the 20-year-old lathe which also went back to work.

Mr. Sparling then addressed another letter to the White House. He wrote:

"In the last 18 months we have turned out approximately 18,000 flanges. We work on an average of 15 hours per day, 7 days per week. There are only 2 men in the shop. I am 60 years old and my assistant is 79 years old; he handles all flanges from 12 in. down and I take them from 14 in. up to 30 in. We feel, owing to our age and the amount of work we are doing, we are entitled to a pennant. I am enclosing 2 snapshots of 'the old gent and myself,' and a truckload of the finished product that we got out from Friday night until Monday morning. Some of the castings weigh 365 pounds. We are very glad that we are able to help in this defense work. And it gives us money to buy bonds and stamps."

The President referred this letter to Donald M. Nelson, Chairman of the WPB, and Mr. Nelson instructed that this two-man shop be sent a large American flag poster. He also announced that the two-man plant would be fully recognized as a Labor-Management War Production Drive Committee to head the list of 1,300 other war production plants enrolled in the drive, some of which have over 60,000 employees in multiple buildings covering miles.

Then from Chairman Nelson, in the Nation's capitol, this letter was sent to Mr. Jake Sparling:

"Your report on your war work is an example of what two free American workmen with initiative can do. Please accept my congratulations and also transmit them to Mr. Fogelsonger. I fear working the schedule you follow of 15 hours a day, 7 days a week is a little too strenuous for some even younger workmen to maintain, even though you two gentlemen seem to thrive on it.

"I am instructing War Production Drive Headquarters to enter your name at the top of the lists of all plants formally enlisted in the War Production Drive in recognition of the example the entire working force of your plant is setting for the rest of the Nation.

"In recognition of your achievements, I am having sent you the largest American flag poster surmounting the inscription "Give It Your Best.' You have."

With the Nation recognizing such undaunted patriotic effort, let no one say "There is nothing I can do."

SPECIAL BAGS FOR SWEET POTATOES

The first shipment of sweet potatoes ever made in paper has been announced by the Union Bag and Paper Corporation, New York City, manufacturers of the containers, specially developed and constructed for sweet potatoes.

The shipper was F. H. DeZauche and Son of Opelousas, Louisiana, and the receiver was Albers Super Market, Cincinnati, Ohio. After six days in transit, the bags arrived at destination and were inspected by the Department of Agriculture. Report of the inspection showed that the contents were in excellent condition with not one bag broken.

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▶▶▶ IN THE 1941 ANNUAL REPORT of the Scott Paper Company of Chester, Pennsylvania, it was stated that an agreement had been entered into with Nairn Falls Pulp Company, Province of Quebec, Canada, providing for the supply of approximately 12,000 tons of groundwood pulp per year, and that Scott Paper Company had agreed to make certain capital expenditures for production equipment for this purpose. It is now reported that the equipment installed at Nairn Falls Pulp Company is operating at approximately its rated capacity, and shipments are being made regularly to the Chester plant.

◆

INDUSTRY'S TRAFFIC COMMITTEE MEETS

The American Paper and Pulp Association has recently issued a report of the meeting of the industry Traffic Committee which was held September 18 at the Waldorf-Astoria Hotel, New York City, regarding compliance by the industry with General Order ODT No. 18—Maximum Freight Car Loading. This order, issued by the Office of Defense Transportation, has been amended and becomes effective October 15 instead of September 15.

The importance of determining standards for uniform industry-wide observance and specific suggestions was recognized, and problems of loading and handling of paper by leading grades under this order were presented and discussed. To assist in formulating recommendations as to standards, those attending the meeting and others addressed were invited to submit any further information or suggestions to the following individuals who have consented to collect such data with respect to the papers with which their names are identified:

Printing and Writing Papers—F. F. Kator, The Mead Corporation, Dayton, Ohio

Paperboard—C. L. Fenstermaker, Sutherland Paper Company, Kalamazoo, Michigan

Wrapping and Bag Papers—J. D. Patterson, Union Bag and Paper Corporation, New York City

Glassine Papers—J. D. Patterson, Union Bag and Paper Corporation, New York City

Newsprint Paper—H. Ignatius, International Paper Company, New York City

Groundwood Papers, other than Newsprint—J. A. Quinlan, St. Regis Paper Company, New York City

Tissues and other Light Weight Papers—A. A. Raphael, New England Paper and Pulp Traffic Association, Boston, Massachusetts

Boxes—C. L. Fenstermaker, Sutherland Paper Company, Kalamazoo, Michigan

Pulpwood—H. T. Ratliff, The Champion Paper and Fibre Company, Hamilton, Ohio.

It was also requested that a copy of any suggestions be sent to the office of E. W. Tinker, executive secretary of the Association.

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TWO PAPER MILLS IN THOROLD, ONT., GET POWER CUT

The Ontario Hydro-Electric Power Commission was ordered to reduce the power load supplied to two paper companies in Thorold, Ontario, from 40,000 to 15,535 hp. on October 1, according to an announcement by the Munitions and Supply Department at Ottawa. The order called for a drop from 31,000 to 10,500 hp. supplied to the Ontario Paper Company, Ltd., and from 9,000 to 5,035 hp. to the Beaver Wood Fibre Company, Ltd. This curtailment affects about 400 employees, and the National Selective Service has already taken steps to find jobs for them.

In announcing the restrictive order, Power Controller, H. J. Symington emphasized that the power shortage areas of Ontario and Quebec are faced with a deficit of some 400,000 hp. He estimated that of this about 140,000 would be found through the operations of regulations announced on September 12 (prohibiting the use of electricity for advertising signs, show windows, and other non-essentials). From voluntary curtailment by the citizens of the affected areas, he expected another saving of 100,000 hp. The remaining deficit of 160,000 hp. must be made up by further restrictions on non-essential power users.

CAN. NEWSPRINT COMPANIES ASKED TO REDUCE POWER

It is authoritatively stated that negotiations have been initiated by H. J. Symington, power controller of Canada, with several St. Lawrence River Valley newsprint companies to stagger schedules of operating days so as to conserve power for production of war materials. The reported suggestion is said to have the support of R. L. Weldon, Canada's newsprint administrator. Should the plan be accepted, approximately 50,000 additional hp. would be diverted to the production of aluminum and other essential war supplies, an informed source said.

Under the plan, the nine newsprint mills would operate on a six-day week basis, closing on different days. Closing days reported under consideration for the mills are: Canadian International Paper Company, Three-Rivers, Monday; St. Lawrence Paper Company, Three-Rivers, Tuesday; Anglo-Canadian Pulp & Paper Company, Quebec City, Wednesday; Donohue Bros., La Malbaie, and Abitibi Pulp & Paper Company, Beaupré, Thursday; Donnacona Paper Company, Donnacona, and Consolidated Paper Corporation, Three-Rivers, Friday; Consolidated Paper Corporation's plant in Shawinigan Falls, Saturday; and Consolidated's plant in Grand 'Mère, Sunday.

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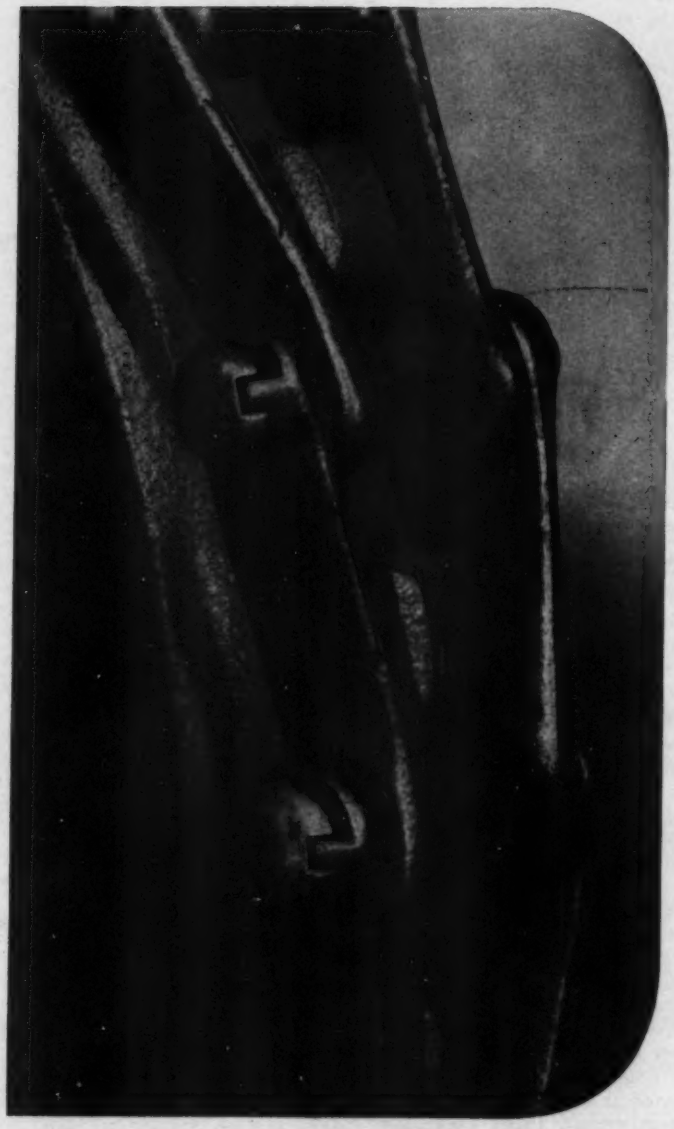
MAXIMUM LOADING ORDER IS EXTENDED

The order requiring maximum loading of freight cars has been made effective October 15 instead of September 15, in order to give shippers an opportunity to adjust their operations. Maximum loading of paper presents difficult problems, as the ability to load a freight car to capacity with jumbo rolls is limited. In the case of narrow rolls this can be done, but in the case of wider rolls there is not room in a car for a double tier of such rolls. The question of handling paper shipped in skid form is also a problem, and the paper industry's traffic men are working out practical solutions in conferences with the Office of Defense Transportation.

Excellent work has been done in the pulpwood phase of the problem, trucks being utilized to a capacity hitherto considered impossible, and the government authorities are delighted with the manner in which pulpwood is being shipped in accordance with transportation necessities.

THE LONG-LIFE COMBINATION



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≻FLINT-RIM≺
Sprocket Wheels

● Long after ordinary cast ferrous chain completes its normal span of service, a Promal chain usually works on and on, even though subject to adverse conditions.

Promal chains are tough under shock and strain; they are hard in the face of abrasion; they have great strength in proportion to weight and bulk.

Where the work is hard on ordinary chains, Promal chains will give you longer, lower-cost service—more dependable operation—deferred replacement needs.

Flint-Rim Sprocket Wheels resist abrasion and will last several times as long as gray iron wheels. They have fully demonstrated that they are the most durable and satisfactory cast type of tooth sprocket wheels.

For best results use them both in combination on your elevators, conveyors and slow speed drives.

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THROW YOUR SCRAP INTO THE FIGHT!

LINK-BELT
CHAINS AND SPROCKETS
For Conveying and Mechanical Power Transmission

FEEL SCARCITY OF LOGGERS IN CANADA

Information placed before Elliott M. Little, director of National Selective Service in Canada, early in September revealed that as lumber requirements mount steadily, Canadian forests face a shortage of more than 53,000 lumbermen. A survey of the situation and subsequent conferences between Mr. Little and lumber and pulpwood producers showed the need will increase to 110,000 by December, when logging is heaviest.

Mr. Little has appealed to farmers to help in relieving an acute shortage of lumbermen during the agricultural off-season. In a statement made in answer to reports that men in some sections were leaving logging and lumbering jobs for fear they would be frozen to their present jobs under new regulations, Mr. Little gave assurance there was no freezing of these workers. The Quebec Provincial Government, headed by Premier Adélard Godbout, is doing all possible to cooperate with the federal government in endeavoring to overcome the scarcity in lumber workers.

◆

CHAMPION MEN EXPERIMENT WITH GAS SUBSTITUTE

The problem of rationed gasoline and tires has been carefully considered and solved by the officials of the Canton (North Carolina) Division of the Champion Paper and Fibre Company. Faced with the prospect of being forced to curtail operation of the fleet of trucks which haul in wood, the company has started using hardwood tires on several of its vehicles and has developed a novel device to produce a gasoline substitute from charcoal. Although the company has no plans for the construction of wood tires, it is putting a lot of time and thought on perfecting its charcoal gas innovation.

Learning from Sir Herbert Gepp, an Australian paper manufacturer who visited western North Carolina this summer, that a charcoal gas-producing process had been developed in Canada, Reuben B. Robertson, Sr., executive vice president of the company, sent C. A. Stone, plant engineer, and J. L. Setzer, head automobile mechanic, to Three Rivers, Canada, to study this process. With the information gained there and a great deal of experimentation of their own, the two men have equipped one of the company's half-ton trucks with a charcoal gas unit.

The unit is installed on the outside of the truck and has a capacity of approximately three bags of charcoal (enough to operate the truck for a day). Only about a quart of gasoline is needed daily to get the engine started, and after the engine is warmed up for about five minutes on the regular gasoline, it can easily be switched over to the charcoal gas, on which it runs smoothly the rest of the time. A maximum speed of 45 miles an hour can be obtained, which, of course, is more than the national limit of 35 miles.

The first apparatus cost approximately $500 to install, but those now being built will cost much less and be more compact. The equipment is being rigged up almost entirely from salvaged material at the plant, thus cutting down on the expense of construction. A passenger car for Mr. Robertson is also being equipped with the device.

◆

HAMMERMILL GETS FIRST "E" AWARD IN THE INDUSTRY

The 49th award of the coveted Army-Navy "E" pennant was observed with impressive ceremonies on September 15 at the plant of the Hammermill Paper Company in Erie, Pennsylvania. More than 1,600 employees and guests of the company gathered for the official presentation which took place on the company grounds near the plant. A large stage had been erected and the grounds decorated with American flags and palms. Added to the colors were the blue of the Navy and the khaki of the Army. The "E" flag was officially presented to Norman Wilson, president of Hammermill, by Lieutenant Colonel Charles Cavelli, Jr., purchasing and contracting officer of the Jersey City Quartermaster Depot, Jersey City, New Jersey. Lowell Thomas, radio commentator and author, acted as master of ceremonies.

The Hammermill Paper Company is the first paper mill to receive this honor, and in accepting the award for the company, Mr. Wilson paid tribute to the founders and to the methods employed which have made it possible to merit this award of honor. He said that "harmony and teamwork at Hammermill have been traditional so that for more than 40 years not one moment of paper production has been stopped by dissension within our ranks."

Highlighting the program were a stirring musical program accompanied by the posting of the colors by the color guard of Hammermill men from the reserve militia, while the band played the national anthem. Presentation of Army-Navy "E" pins to employees was made by Commodore Walling. The first pins presented on the stand were to the oldest mill employee in point of service, and to the company's oldest in service woman employee.

During the program, tribute was paid to the 139 Hammermill men now serving in the Armed Forces.

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ELEVEN STUDENTS IN NEW CLASS AT INSTITUTE

Eleven students are in the new class at the Institute of Paper Chemistry. The group has completed its "bush course," a field course in wood technology at Camp Beachwood, Michigan, the first event, annually, for new students at the Institute.

The class consists of: C. Nevin Betts, Columbia, South Carolina, University of South Carolina; Richard C. Calkins, Racine, Wisconsin, Lawrence College; George E. Chamberlin, Des Moines, Iowa, Iowa State College; J. Wayne Dappen, Graettinger, Iowa, Grinnell College; Frank P. Maxey, St. Joseph, Missouri, Marquette University; William G. McAllister, Sioux City, Iowa, University of Iowa; William H. McPherson, Jr., Plattsburg, New York, Syracuse University; Sewell T. Moore, Weldon, North Carolina, University of North Carolina; Philip E. Nethercut, Wauwatosa, Wisconsin, Beloit College; Robert J. Welday, Pittsburgh, Pennsylvania, Allegheny College; Dexter L. Wolf, Appleton, Wisconsin, Lawrence College.

◆

WPB RECONSIDERS ORDER FOR PILOT PLANT—APPLETON

Word has been received by the Sulphite Pulp Manufacturers Committee on Waste Disposal that the War Production Board has rescinded its former order refusing to permit the group to construct a semicommercial pilot unit, and that the go ahead signal is on which will enable the uninterrupted continuance of the progressive attack on the old problem of stream pollution. According to J. M. Holderby, committee representative, the construction of the unit is expected to go forward immediately with the hope that the experimental plant can be in operation before winter sets in.

The permission to build does not carry any priority rating of preference of any kind; accordingly, member mills will be called on to contribute materials from their irreplaceable

These 2 Words MAKE MOTOR-DRIVE More Than POWER!

Motor-drive provides within itself a means of:

Speed Control	Reversing
Braking	Remote Control
Tandem Operation	Controlled Acceleration
Tension Control	Safety

Slow Speeds for Inching, Threading, Inspection

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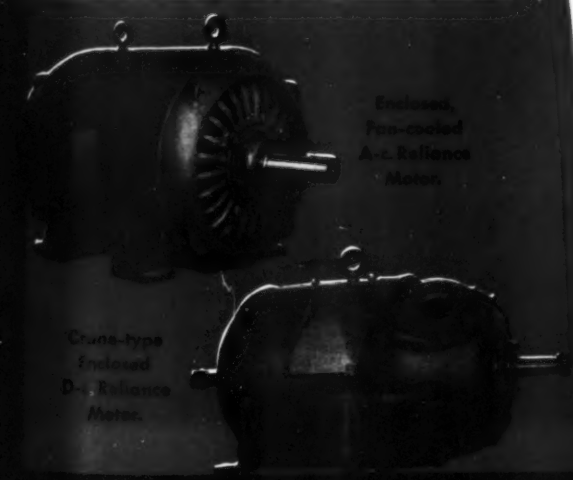

● PRODUCTION jobs, not merely power jobs, are awaiting these RELIANCE MOTORS. They will do *many things* which will aid in performing some part of a production process faster, better, or more safely. Users of these motors will have more for their money because they started their production plans with the question, *"What can we make the motor do besides supply power?"* Get the complete answer to this question when your plans are in their early stages. Invite a Reliance man to sit in . . . He may not have all the answers, but he will have enough of them to be a big help in finding the right one.

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RELIANCE A-C D-C MOTORS

maintenance stocks in order to insure the follow through of research which to them is showing enough progress to warrant such sacrifice. The pilot unit, estimated to cost about $15,000, will be built on the Fox River here, adjacent to the sulphite plant of the Interlake Pulp and Paper Company, a division of the Consolidated Pulp and Paper Company, and just below the Institute of Paper Chemistry, headquarters of the disposal committee.

The reconsideration by the War Production Board of its former decision against the project was the result of an appeal for a rehearing sent in by the committee earlier this month in which the research men pointed out the potentialities of the present experimental program and also the probable development of a construction program which may be no small factor in government efforts to combat post war unemployment.

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▶▶▶ PUGET SOUND Pulp & Timber Company, Bellingham, Washington, last year acquired a huge tract of Nimpkish River forest on Vancouver Island, British Columbia's record timber deal. Owing to labor shortage, development of the Nimpkish River has been slower than expected, but the railroad from Englewood to Nimpkish Lake and from the head of the lake to Daisy River is progressing.

◆

▶▶▶ IN RECOGNITION of having over 90 per cent participation in the War Bond payroll deduction plan, the Peninsular Paper Company of Ypsilanti, Michigan, has been awarded the Treasury Department certificate. A United States Treasury Minute Man flag and a new American flag have been ordered for the company, and upon their arrival, appropriate ceremonies will be held.

◆

UNION BAG CLOSES TWO PAPER MILLS AT HUDSON FALLS

More than 400 employees were laid off when the Allen and Fenimore paper mills of the Union Bag and Paper Corporation, Hudson Falls, New York, were closed on September 25.

In a statement to the employees, Alexander Calder, president, said it was impossible to predict the duration of the shutdown. If the mills are to be closed permanently, employees who have served the corporation between 1 and 5 years will receive an additional week's salary; those employed between 5 and 10 years, two weeks' salary; between 10 and 15 years, three weeks' salary; and all who have been with the corporation over 15 years will receive one month's salary. He also said that every effort would be made to absorb temporarily, or permanently, into the personnel of other operations as many employees affected by the shutdown as possible. The shutdown applies only to the two paper mills and does not affect the bag factories in Hudson Falls.

◆

▶▶▶ AUTOMATIC LICENSES for all distributors of pulp, newsprint, sanitary napkins, and kraft paper have been announced. Inasmuch as price ceilings have been established for these products, distributors will not be interfered with as long as they adhere to the ceilings, but will lose their licenses if the ceiling price order is violated.

◆

MICH. MAY SUSPEND STREAM POLLUTION FOR THE DURATION

Experiments planned by the State of Michigan and a technical committee of the Kalamazoo Valley paper mill industry to clean up Kalamazoo River pollution from the mills may be suspended until after the War, according to Milton P. Adams, secretary of the Michigan State Stream Control Commission. Harry C. Bradford, vice president and secretary of the Rex Paper Company, has been heading the industry's study committee for more than a year.

At a meeting of the Stream Control Commission in Lansing, Mr. Adams stated that a technical man selected by the industry and by Michigan State College to aid in the work had resigned to assist in the war program and that a successor had not been found. Two or three paper mills remain to be tested before the committee can make a final report and recommendations to solve the problem of treating paper mill wastes now dumped into the river. Mr. Adams said he was not optimistic about the chances of finishing the experiments next summer with the help of Michigan State College.

◆

IMPORT CASES

Printed sheets for books, produced on India Bible paper, between 10 and 20½ pounds per ream have been held by the United States Customs Court to be properly dutiable at 2 cents per pound and 10 per cent ad valorem. According to the Import Committee of the American Paper Industry, the importer claimed that the Tariff Act providing the India Bible paper rate for printed sheets did not apply to such sheets weighing 10 pounds or more per ream, but only to the lighter weights, and that the proper rate was 7½ per cent ad valorem as books of foreign authorship. Several other cases, involving the Oxford University Press as the importer, are pending on the same issue, the above decision having been made as a test of the law on this point. The importer is appealing from the decision.

Two cases at Detroit involved the dutiability of paper slightly over 35 pounds in weight and slightly over 4 points in thickness. The Court held the paper was dutiable and not duty free as standard newsprint, as claimed by the importer.

◆

▶▶▶ THE FREE BELGIAN RADIO at Leopoldville, Belgian Congo, reported in a broadcast monitored by the Federal Communications Commission that experiments have been made in South Africa with Mimosa wood for the production of wood pulp. It was also stated that pulp made from Mimosa wood, which is abundant in South Africa, will be sent to paper mills in the Union for experiment on a commercial basis.

◆

▶▶▶ DUE TO THE ENORMOUS expansion programs of government establishments vitally connected with the war effort, purchasing officers are now being sought. These positions call for persons who have had from two to six years of responsible experience as purchasing or procurement officer. Salaries range from $2,000 to $4,600 a year. There are no age limits, and no written tests are required. Application forms may be obtained from the Civil Service Commission, Washington, D. C.

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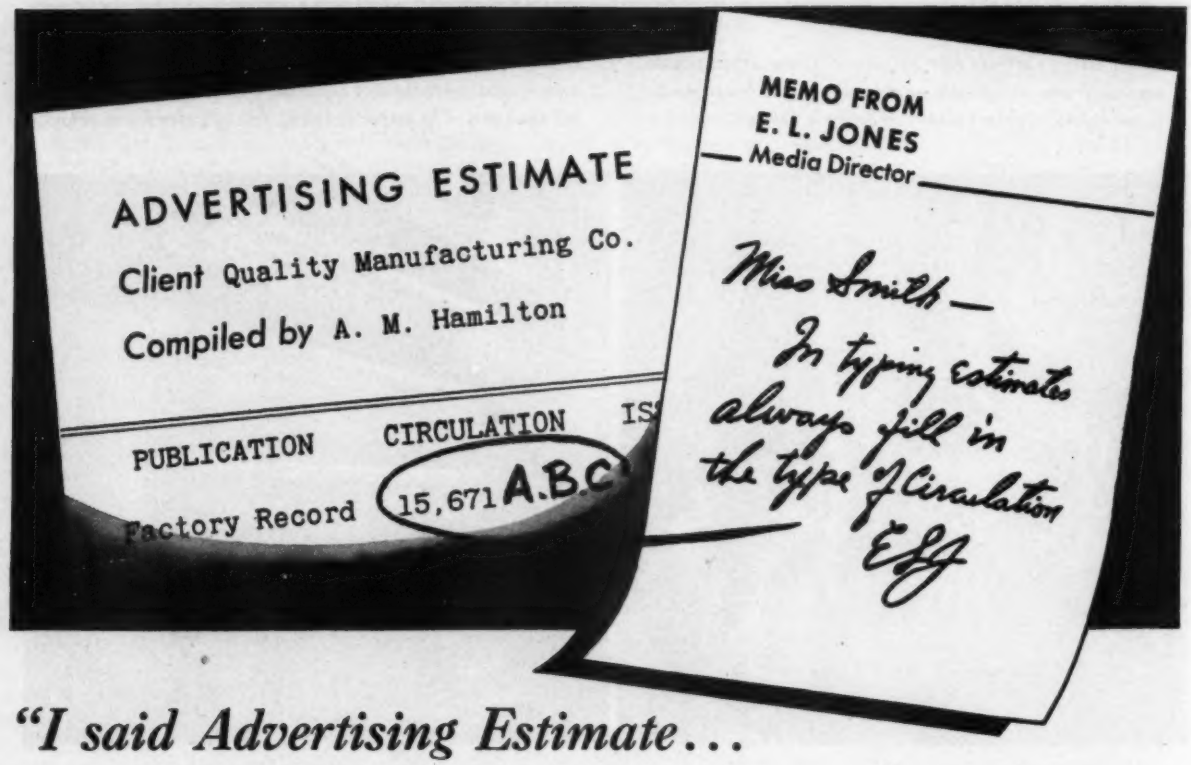

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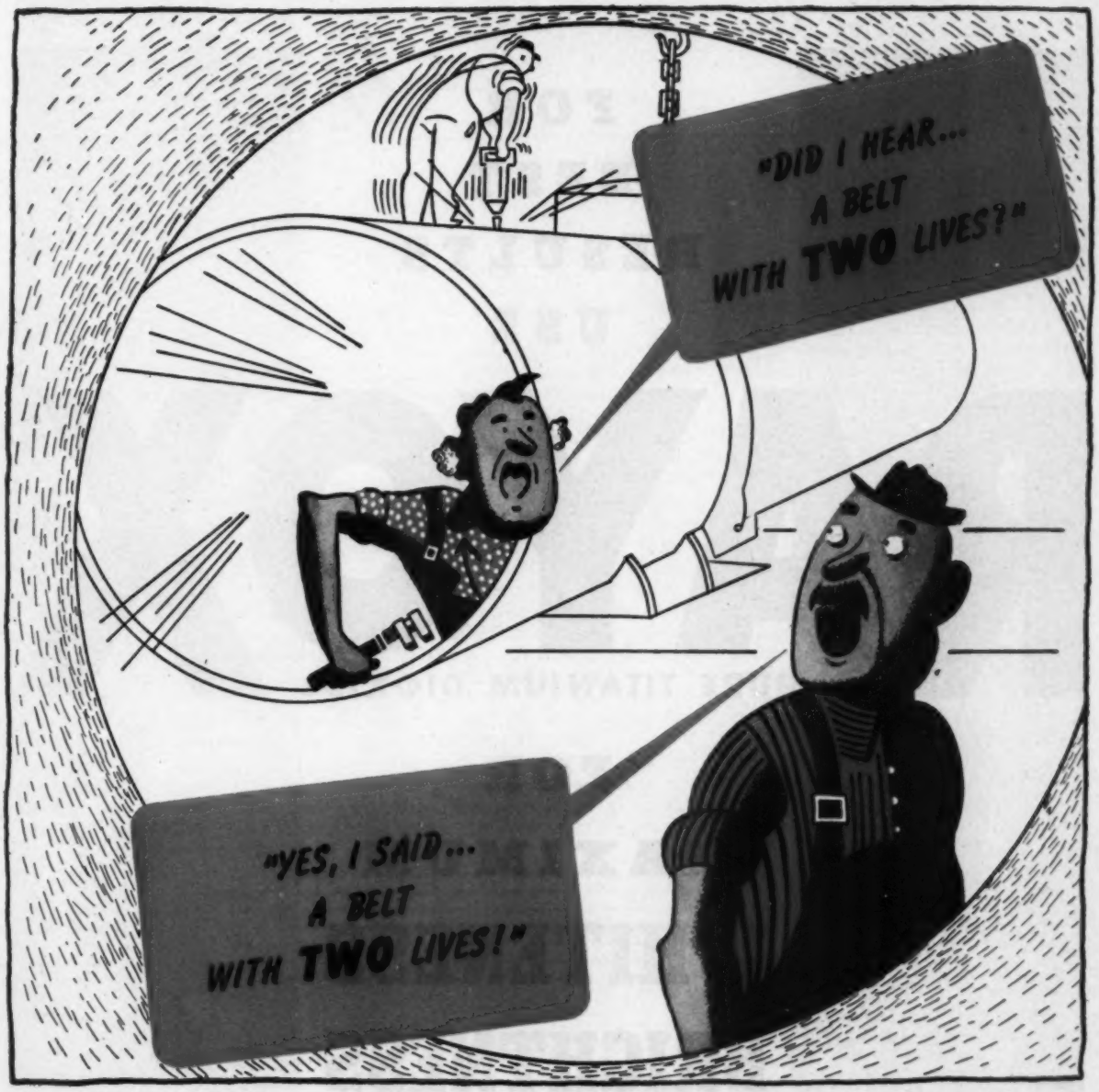
A. B. C.=AUDIT BUREAU OF CIRCULATIONS=FACTS AS A MEASURE OF CIRCULATION VALUES



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On pivoted motor base drives, Research Belting's "built-in" pulley grip and extra pliability relieve tension and flexing-wear — thus increasing leather's normal 2-to-1 service advantage over rubber belts. Ideal for beaters (where overloads are frequent), jordans with small pulleys, pumps that must not stop, chippers, etc.

On fixed center drives — especially paper machines involving high speeds, high torque, cone pulleys — low stretch, high-capacity Research delivers more power, maintains uniform speed, reduces interruptions for takeup. Wherever production must be continuous, use Research.

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EDITORIAL

Fact vs. Optimism

▸▸▸ TO BE AND TO CONTINUE TO BE an optimist on the war procedure, in view of the facts, is like asking Donald Duck to be a blacksmith. Only Walt Disney can effect such a transformation. But the transformation is still at variance with the facts, despite the funny physical gyrations Donald does.

Facts are ugly, stubborn things. Facts govern, in the last analysis, all operations. That is why they are so ducedly important. When you are in possession of the facts in any case, you can certainly predict the outcome of the operations.

Optimism or the doctrine that everything is ordered for the best and that all operations are going to turn out right, irrespective of the facts, is a comforting way to anesthetize one's fact-finding functions for the time being, but when one awakens, what a headache.

What produces true optimism is that balanced state of mind where the facts are in such conformity with the true state of affairs that one can become an enthusiastic supporter of the procedure.

The optimism that tries to make black look white defeats itself and its dupes. Logical optimism is the brand that carries conviction on to victory. It is like Lincoln's story of the man that was obtuse and a mental optimist, who, when asked how many legs a cow had, said, "four." "But suppose," said Lincoln, "you consider the tail a leg, then how many legs has the cow?" "Five," said Mr. Obtuse. "No," replied Lincoln, "the cow has but four legs—a tail is still a tail."

This country is doing a magnificent job of producing war armament and supplies. But, production alone will not suffice. Delivery of armament and supplies to Libya, Asia, Russia, Australia, Alaska, and the South Seas, in workable, eatable, and expendable condition is what is vitally needed.

The War Department, Navy Department, the Government, Industry, and Transportation must all get together to see the problem of armament and supplies through to the fighting lines for instant use—that is the procedure that will win the War.

What are the facts relative to the deliveries of our immense production of armament and supplies at all points of the manifold fighting fronts? Let's all get together to back our fighting forces with properly processed, properly packed munitions and supplies.

The paper industry will deliver the goods so efficiently packed that they will be instantly available upon receipt anywhere, if the facts are given them. These facts, then, will be the basis of a warranted optimism in the war procedure.

Christmas in October

▸▸▸ IT MAY SEEM A BIT EARLY to think of Christmas, but the United States Post Office is asking that all parcels, Christmas cards, and other mail for individuals in the armed forces overseas or on the high seas be in mails not later than November first, if such mail is to reach destination by Christmastide. If mailed early, the Postal, Army, and Navy Departments will do everything possible to see that Christmas greetings arrive on time.

Many gallant young men, and possibly women, too, have left the pulp and paper industry for war service and are now in far-away places. What would give these young people in the service of their country greater inspiration than a Christmas greeting from their former employers and fellow-employees?

Remember, also, that men in the service, the women, too, favor messages of a somewhat humorous character—this Christmas probably will find them needing real holiday cheer more than ever before.

Should the industry take up the idea, what a commemoration it would be for the 100th anniversary of the Christmas card! So far as is known, the first Christmas greeting card made its appearance just 100 years ago in England. Since then, the mailing of Christmas cards, as well as other forms of greeting cards, has become an accepted means by which millions of Americans remember their loved ones and friends.

Christmas cards this year will have a deeper meaning than before. With most of the countries of the earth fighting to save the peace of the world, the 1942 holiday greetings will express a deeper love of home, friends, our country, and leave with those who receive them a finer realization of all that Christmas means.

AN EXAMPLE OF FREE ENTERPRISE

▸▸▸ THE CONSTITUTIONAL FORM of government under which we have grown provides for the profit system, based on free enterprise—the system we are warring to maintain. That is the keystone in the arch of our American success. The foundation stones for that arch are research and development. In no other country on the globe can you find the principal oil company spending five million dollars a year for research and development. Nowhere else can you find the principal electrical manufacturing company eagerly maintaining a research laboratory that involves an expense of some fifteen millions of dollars annually. Where would you go to find the principal chemical corporation spending upwards of twenty millions of dollars a year on research and development? Nearly every other powerful nation has spent the past twenty-five or thirty years developing instruments of death: bombers, guns, warships, submarines, soldiers—while here in the United States we have spent that time developing technicolor, Kodachrome film, refrigerators, automobiles, streamlined—air-conditioned trains, national parks, radio, and television. . . . That is the peacetime meaning of "free enterprise."

Now that we are at war—let's see what the peacetime developments of a single industry (the petroleum industry) mean to us in our wage for Victory.

One of the things we most need to blast our enemies is TNT. That is the basic explosive used in bombs, shells, and torpedoes. It is made from toluol—chiefly obtained from coke-oven vapors and the distillation of coal tar. Such a source was undoubtedly quite adequate during peacetime. However, scientific research is curious and merely to be "quite adequate" is not enough. So, back in 1932, experimental engineers connected with the petroleum industry discovered and developed a means for the production of synthetic toluol from petroleum—a development brought to the attention of the United States Army at that time. So important was this development, that with the "bugs" fully ironed out of the manufacturing processes, a large plant was put into full-scale production considerably in advance of the historic December 7, 1941. Today, probably three-fifths of all the bombs which the American forces use to blast the treacherous enemy into kingdom come are filled with TNT made from synthetic toluol—a product of the petroleum industry.

The wings and fuselage of all planes, whether bombers, fighters, pursuit, reconnaissance, or cargo, carry a network of cable controls. In the average two-motored bomber, there is something more than a mile of wire rope running back and forth through the plane for its control. Through these control cables the elevator, the rudder, the aerolones, the bomb releases, the machine guns, are operated. These cables must operate over small, anti-friction bearings (little sheaves or wheels) which must turn freely. Obviously, such bearings must be lubricated. That seems simple, until you realize that this lubricant must operate perfectly in the 60 degrees below zero Fahr. stratosphere, as well as in the boiling heat of Libya. Through research there has been developed, and is now used, a lubricant that will operate perfectly in all temperatures ranging from 65 degrees below zero to 150 degrees above zero Fahr.

The torpedoes, launched into the sea from plane, submarine, PT boat or warship, must have a special grease for its propeller—one that will keep the propeller spinning, stick tight and not wash off in the salt water, refuse to congeal in the cold water, or become light because of the hot interior temperatures of a submarine.

The writer knows from personal experience the irritation that can be caused by the lowly, despised and filthy cootie. While many witticisms were made over the "cootie" during World War I, please be assured that typhus-carrying vermin is no joke. Countless were the safety razor blades ruined by us soldiers in France as we angrily and industriously shaved our bodies to free ourselves from the lice. Today, thanks to the petroleum industry, the United Nations' forces use a compound which will kill all lice, ticks, fleas, chiggers and other unwelcome parasites, whether on the skin or in the seams and texture of the clothing.

During recent months the nation has been sugar minded, without, shall I say, being sweet about it. We resent being pushed around with ration cards which seem to us to be needless. However, sugar is peculiar unto itself in that it is both good to eat, and good to shoot with. You see, sugar readily can be turned into alcohol, from which we can get powder for shells. For several years past, alcohol has been made from petroleum, and thanks to this development, the petroleum industry is saving for the United States nearly 500,000 tons of sugar which otherwise would be demanded for industrial alcohol.

Everyone knows that ordinary oil has the unfortunate characteristic of thinning in hot temperatures and congealing in cold temperatures. This would be most distressing today, when our armed forces are working gun turrets, airplanes, and machine guns all the way from Iceland to New Guinea, were it not for development, by the chemists in the petroleum industry, of a derivative of petroleum itself which largely controls the tendency to thicken or thin. Without cold-running oil, and substantial-hot oil, made possible by these special compounds, we might conceivably lose this war.

More recently, the men of the petroleum industry have developed a compound from their product, which, when applied to tarpaulins, tents, motor truck covers, etc., gives absolute immunity to mildew.

But not all developments to be credited to the petroleum industry are limited to oil or derivatives thereof. Many have been the mechanical changes brought about through their research.

Take a battalion of tanks on the run, for instance. They are chasing the enemy—and have no time to stop for refueling. They must be refueled on the run if the enemy is to be caught and defeated.

It is too early, as yet, to talk definitely about the synthetic rubber now being produced from petroleum. There is much field work yet to be done before there is final proof of efficiency.

There are many jobs confronting the petroleum industry. But this industry, like our own, is living in a land where free enterprise is encouraged and fostered. Roll up your sleeves and empty your pocketbook that this system of government may be preserved.

The ROLL-O-FINER

Handles raw and free stocks at high consistencies with positive, controllable roll pressure. Highly efficient fibre treatment. Equipped with stone or steel bars. Basalt Lava stone treatment ideal for high strength development, without cutting. Produces superior stock from kraft, sulphite, and ground wood screenings. Roll designed to prevent stock submergence, with resultant low H.P. Built and operating in U. S. Many successful installations. Ask for Roll-O-Finer Bulletin.

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Diagram of spiral travel of stock from feed to outlet. Stock cycles around the roll a number of times while it is traveling length of roll.

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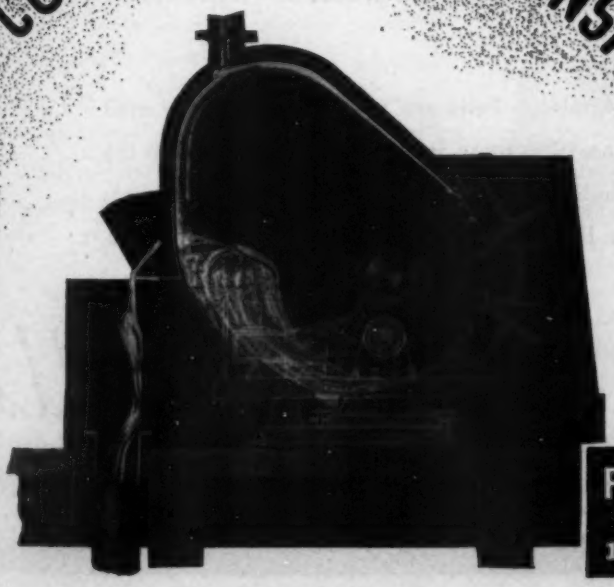

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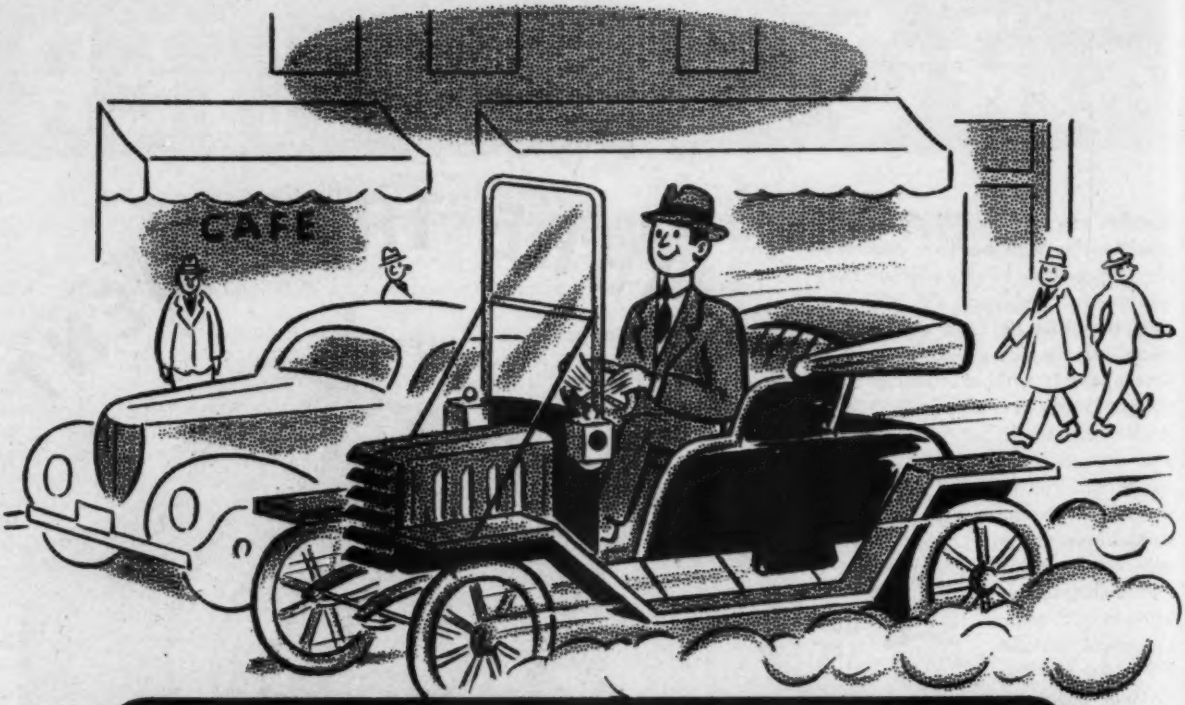

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Service that paper mills expect from quality equipment, designed and manufactured with technical foresight, to meet the high speed production requirements of mills—

APPLETON FELTS make good paper

Today Appleton Felts are preferred by paper mills because since 1890 these felts have progressed with the industry, meeting each year the production requirements placed upon them—today's standard for paper mill felts.

Appleton Woolen Mills

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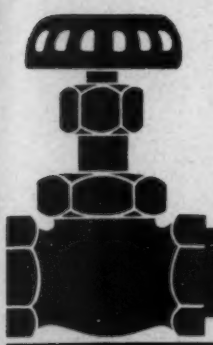

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In these critical times when uninterrupted production is all-important, every minute saved in maintenance means more productive hours.

Lunkenheimer "N-M-D" (non-metallic disc) Valves cut maintenance time to the bone, because it's only a matter of minutes to renew a worn disc and keep the valve on the job.

Users of Lunkenheimer Valves are profiting from their wise policy of buying highest quality. They are getting continual tangible evidence of what really good valve performance means in dependable and low-cost service.

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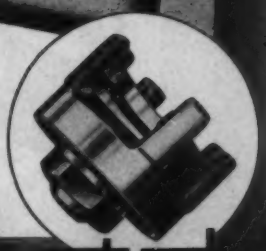
With a few spare disc holders complete with discs on hand, the time required for renewing can be cut to almost nothing.



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Ships, planes, guns, tanks start in a coal mine

This is a war of machines and armaments, and vast quantities of power are required to build them. Despite all the other forms of energy, 60% of all horse-power required by American industry comes from coal.

Our whole civilization is based on coal, and our whole *defense* of that civilization is based on it. Coal provides heat. Gasoline can be made from coal. Rubber is about to be made from it. Many vitamins are coming from coal's derivatives.

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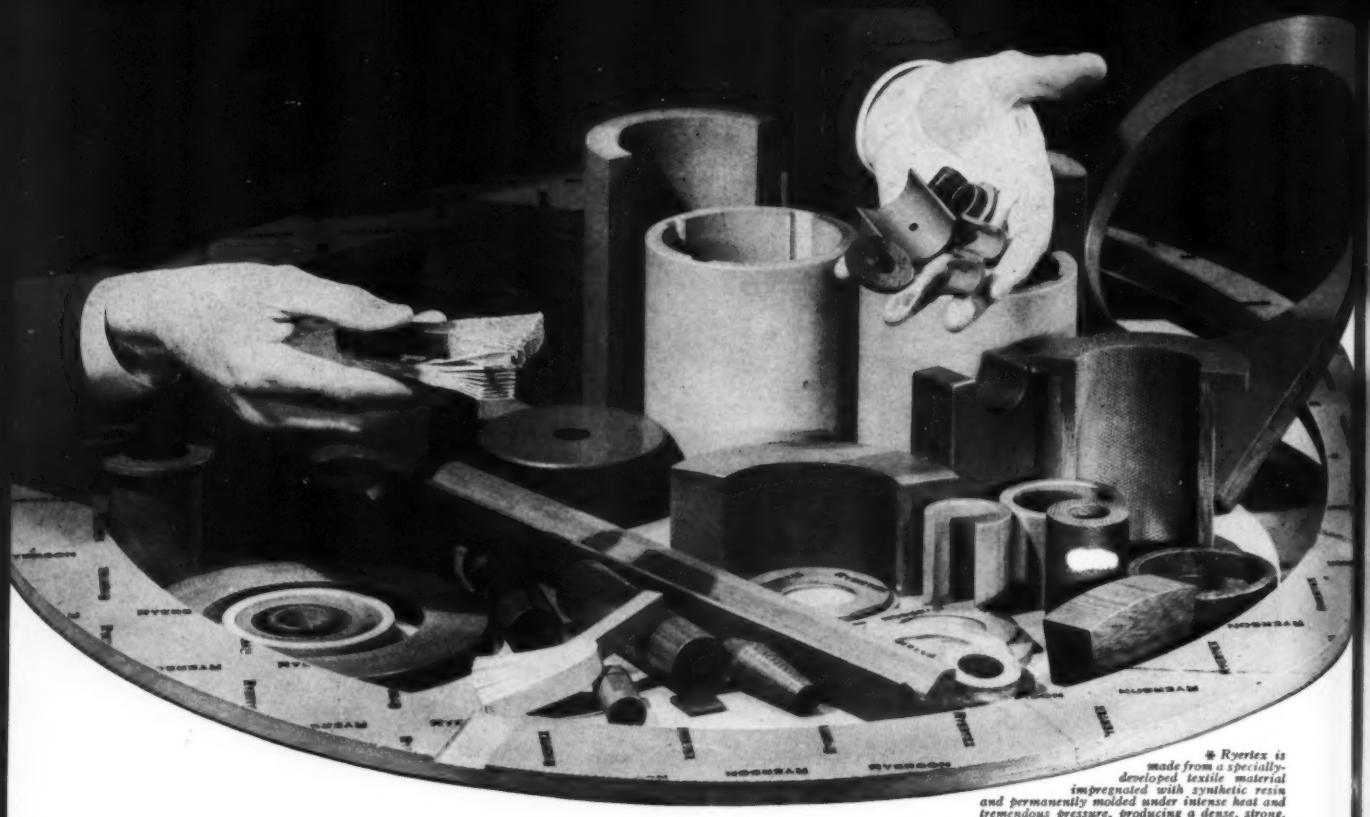
Buy United States
War Bonds and Stamps

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY

Workers in our Bartlett Hayward Division are now privileged to wear the Navy "E" emblem



* Ryertex is made from a specially-developed textile material impregnated with synthetic resin and permanently molded under intense heat and tremendous pressure, producing a dense, strong, hard-surfaced bearing that has proven capable of withstanding very heavy continuous loads. It is manufactured exclusively for Joseph T. Ryerson & Son, Inc., by the Continental Diamond Fibre Co.

Ryertex* *Non-Metallic* Bearings Now Replace Babbitt and Bronze

Save Strategic Metals — Easy to Install

Switch your machines to Ryertex Composition Bearings and forget bearing worries for the duration . . . and *after!*

It's *easier* to get Ryertex. *Smart engineering* to use this better bearing material. And *common sense* to avoid draining scarce stocks of brass, babbitt and bronze now that Ryertex is available. That's why many industries are quickly changing to this superior, non-metallic bearing.

Fortunately, Ryertex won its spurs as a superior bearing material years ago. Now, proof-tested and with enviable performance records, Ryertex is ready to go to work for you.

Ease of installation and very moderate cost are only *two* reasons why you should consider Ryertex. Challenging all production and maintenance engineers are these additional reasons.

Ryertex has a lower frictional coefficient than bronze or babbitt....

.....can carry greater loads—
.....is longer wearing—
.....harder (Scleroscope Test)—
.....corrosion resistant—
.....lighter—
.....uses oil, grease or water lubrication—
.....conserves hard-to-get metals—
.....saves power, downtime, and results in a better product.

Send us your inquiry and specifications for prompt action.

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PHYSICAL PROPERTIES

Specific Gravity	1.37
Weight per Cu. In. Oz.	0.8
Modulus of Elasticity, psi	1,500,000
Tensile Strength with grain, psi	9,400
Tensile Strength across grain, psi	7,000
Compressive Strength, Flat, psi	37,500
Compressive Strength, Edge, psi	25,000
Bending Strength, psi	18,000
Water Absorption in 100 hrs.	1.07%
Scleroscope Hardness	75
Max. Operating Temp. Deg. F.	275
Thermal Coeff. Expansion	30 x 10^{-6}
Dry Coeff. of Friction	0.280
Permanent Set per 1" thickness under load of 1000 psi	.002

RYERTEX *non-Metallic* BEARINGS

WPB Studies Concentration Plans

THOMAS J. McBREEN

▸▸▸ WITH THE IMPACT OF THE WAR ECONOMY on the paper and paper products industries requiring changes in operations, the War Production Board is considering plans to concentrate production and is using the British experience as a guide in arriving at a concentration formula.

Many of the basic considerations that led to concentration of the paper industry in Britain are widely different from production problems in this country. Nevertheless, the British experience will be used largely as the general pattern for U. S. concentration.

Production was concentrated in Britain in a portion of the various plants operating in industries which were subject to material controls as a means of conserving labor and floor space. In this country, the concentration of production is developing primarily to conserve labor, with efficient use of floor space a secondary consideration. Another primary consideration in the United States is maintenance of efficiency of operations of the various industries to which concentration will be applied, thereby providing a control over costs of production. In addition, conservation of equipment is an important factor here.

Considerations which are being studied by WPB officials in connection with concentration of the paper and paper products industries in this country include all of the above, together with the transportation problem. Organization of the paper industry in such a manner as to provide for minimum use of transportation facilities of all kinds is being given serious consideration.

Concentration of Papermaking in Britain

British experience with concentration of the paper industry reveals that provisions relating to the plan were contained in Control of Paper Order No. 34, issued by the Ministry of Supply on September 5, to become effective September 11, 1941. This order enabled the Controller of Paper, on behalf of the Ministry of Supply, to issue directions under which:

1) Any specified paper produced by one company on behalf of another which has ceased wholly or partly to produce paper of any description, may be delivered by the producer manufacturing it to the producer who has ceased production without the need to obtain a license under the Control of Paper Order No. 29.

2) The maximum price as set out in the Control of Paper Order No. 25 will not be applicable to such a transfer.

3) The producer who has ceased to manufacture will be required to obtain any necessary licenses before such paper can be delivered by him and any sales by him must be at prices not in excess of those which would be permitted to him if he had produced the paper himself.

This scheme illustrates the method of concentration which has been used, under which a firm designated as a nucleus firm produces for other firms which have been closed, the latter continuing their sales operations. Another type of concentration scheme which has been used in Britain calls for complete suspension of operations by non-nucleus firms, with nucleus firms taking over all functions including sales, and paying commissions or fees to the operators of the shutdown plant.

Concentration of papermaking in Britain was accomplished with less facility than in other industries because of technical difficulties which were encountered. Box and carton makers, for example, were concentrated in the fall of 1941, but papermakers (especially those in newsprint production) objected strenuously to the Board of Trade proposal that they center production in a few mills which would be able to operate at capacity.

Toward the end of November, the Board submitted a statement of principles respecting concentration, together with a list of mills which were regarded as suitable for closure. Twenty-five mills were listed, including some which had effected voluntary concentration. The industry countered this plan with a proposal that concentration be accomplished through stopping machines rather than mills. It was argued that much of their labor was traditionally attached to the mills and was not mobile, and also would not be absorbed in war industries. The Board of Trade refused to accept this proposal since it would not save floor space. Eventually, the question was put up to the Industrial and Export Council, which ruled late in December, 1941, that concentration would proceed on a voluntary basis.

The effect of this decision was that nucleus certificates were granted to those paper and board mills which had to be kept going because their production was essential to the war effort. About 50 mills would not qualify under these conditions. It was provided that these could still concentrate voluntarily, but that they would in any case continue to receive a quota of raw materials if such materials could be usefully employed.

By June, 1942, 170 paper and board mills had received nucleus certificates upon recommendation of the Minister of Supply on the grounds that their products were essential to the war effort. At that time, only two firms had made concentration arrangements with other mills, but 15 mills had closed down. There were still 46 mills running without nucleus status, but 16 of these have been recommended for nomination as nucleus firms.

Concentration of the paper box and carton making industry by April, 1942, had proceeded to the point where 1,100 workers already had been released, and it was expected that 140 more would be released. At that time, 1,646,000 square feet of floor space had been made available, with an expected 157,000 square feet more to come, which would make a total of 1,803,000 square feet. This was accomplished through a voluntary program.

When the concentration of the industry was announced, applications for nucleus status were received from 218 producers in the field. Most of these applications were made on the grounds that their plants were running at capacity. However, certificates of nucleus status were granted to but 54 plants.

EDITOR'S NOTE: The War Production Board has made a study of concentration methods for the paper and paper products industries of the United States, using the experience of Great Britain as a general pattern for formulating such plans. The author has prepared this analysis of the concentration of the paper industry in Britain with a discussion of the possibilities for concentration currently under study by the WPB.

Between June and August, 1941, while these applications were being examined, a number of meetings were being held between the Board of Trade on the one hand and the British Carton Association and the British Paper Box Manufacturers' Federation on the other. Both associations argued that there was not room for much concentration within the industry. This condition, it was contended, arose from the fact that there were a number of difficulties involved for which adequate solution could not be found—particularly those in connection with matters of transport and those growing out of the individual nature of products of different firms.

As a result of these conferences, it was decided on August 19, 1941, not to proceed with compulsory concentration of the industry. Panels were appointed by both associations to advise the Board on technical matters in connection with voluntary concentration.

At informal meetings with the London Federation of Master Box Makers, the Board of Trade heard arguments in favor of complete withdrawal of the industry from the concentration scheme. Argument of the trade representatives was that the method of issuing nucleus certificates was both unjust and uneconomic. In view of the fact that some certificates already had been issued and some production already withdrawn, the Board decided that there could be no question of this. It was agreed, as a result of the meetings, however, that certificates should, as a rule, be issued only to those firms which had made genuine concentration arrangements, involving the closing of one or more factories, and that all other firms should be left to carry on operations as though concentration never had been applied to the industry.

Concentration was carried on along these lines until June, 1942, at which time the Board of Trade decided to formulate a new plan for the industry. Three advisors with practical experience were appointed by the Board to make a survey of the industry, region by region, following which the Board proposed to make nominations for nucleus status firms on the condition that such firms could arrange to absorb production of firms which were to be closed.

Establishments engaged solely in the manufacture of composite containers or fiber board packing cases were not to be brought into the plan, and other types of firms also might be exempted. All firms not specifically exempted, would be required, on the basis of the plan, to co-operate. Failure to do so would render them liable to complete withdrawal of their labor forces, and make them ineligible for further government contracts. In addition, they would be liable to curtailment of their raw material supplies, or such supplies might be withdrawn altogether.

The Board is now going over the returns of the survey which was made, and it is anticipated that the concentration plan for the industry will be placed on a nominative basis sometime this fall. This will mean that the government will take an active part in the program, which will cease to be voluntary.

Concentration Plans Studied by WPB

These considerations and experiences of the British government in connection with concentration of paper mills and the fiber container industry will play an important part in decisions which will be made by the Container Branch and the Pulp and Paper Branch of WPB in concentrating these industries in this country.

General studies of the British concentration scheme already indicate that the nominative, or government-controlled system, will be favored in this country as opposed to concentration on a voluntary basis. In concentration of both industries in this country along the nominative lines, WPB officials will attempt to proceed according to a well defined program in order to avoid some of the experiences which the British encountered.

Location and general operating requirements of mills in paper production will play a part in decisions which will be reached here. For example, there will be more of a tendency on the part of WPB officials to designate integrated operations (producing in continuous operation from pulpwood to paper) as nucleus mills, in order to save transportation, than there will be to designate non-integrated mills as nucleus firms. Nearness to markets also will play an important part in the designation of nucleus firms. Similar considerations will affect concentration of the fiber container industry.

The degree to which the industries will be concentrated will depend to a large extent upon demand for products and availability of supplies for manufacture. Demand for some paper products has dropped sharply since the War began. An example of this is to be found in newsprint, and the trend seems likely to continue due to sharply falling volume of consumer goods which will result in decreasing volume of advertising and consequently, decreased demand for such paper. As a result of this, there will be large opportunities to concentrate the required production into fewer mills which can then operate at capacity.

An example of the effect which availability of supplies will have on the industry is to be found in the case of decreased supplies of certain types of Canadian pulpwood and the effect this decrease will have on ability of industry to produce certain types of paper. Another example is to be found in availability of machinery. Outlook is that most paper mills and fiber container factories will be required to get along with the machinery now available to them, until after the war. As a result of this, WPB officials will have a tendency to concentrate the industry in such a manner as to conserve existing equipment in order that it will be available for future use.

The consideration that paper and paper products are necessary to the war effort will play an important part in determining which plants will be closed and which will be granted nucleus certificates. An outstanding example of this is to be found in the fiber container industry. Recent developments in production of containers have been so rapid that many types are now being used where metal containers were required before. This results in a saving of critical materials, which is highly considered by WPB. Plants manufacturing such containers undoubtedly will be given serious consideration for nucleus status in the program. On the other hand, there will be a tendency to close plants which are producing non-essential paper products.

Labor conservation undoubtedly will constitute a major factor in the concentration plans. The impact of labor shortages already is being felt from the cutting of pulpwood on through the industry to manufacture of various finished products. War industry jobs already have attracted woods labor in certain areas to such an extent that OPA has permitted increase of some wood products so that higher wage payments are possible. Indications are that with decreasing labor supply, similar action may have to be taken to secure labor for cutting pulpwood, and there is no guarantee that such action might eliminate the pressure of the labor problem.

As a result, availability of labor supply for all phases of operations within the industry will be an important factor considered by WPB officials in designating nucleus plants.

▶▶▶ One basic problem which concentration presents concerns compensation of plants which are closed as a result of the program. There are two

ways of approaching the problem: (1) through permitting firms within the industry to work out their own compensation plans, or (2) through government dictation of terms and conditions.

Britain has adopted the former policy, permitting parties to concentration arrangements to work out their own plans, but has usually insisted that proof of the bona fide nature of the plan be presented before certificates of nucleus status are granted. However, through a system of administrative sanctions, Britain has retained control over factors which must be considered by parties to such arrangements.

For example, in pricing commodities which are produced under a concentration arrangement, regulations prescribed under the Goods and Services (Price Control) Acts indicate that certain irreducible expenses must be recognized. This applies both in the case where the nucleus firm is manufacturing at cost for a closed firm which is continuing its selling function and where the nucleus firm has assumed all operations of the closed firm, including selling.

In addition, the administrative sanctions scheme extends to taxation. For purposes of taxation, items of expense incurred by nucleus firms are significant. Likewise, recognition that there is no necessity for non-nucleus firms (receiving compensation from a concern continuing operations) to incur certain expenses of operation, is important. Allowance or disallowance of specific items for purposes of taxation constitutes an important factor which might be used to control operations of compensation schemes.

Britain's Central Price Regulation Committee has decided that all payments which nucleus firms have made or might make to closed firms under concentration schemes must, for the purposes of the Goods and Services Acts, be treated as allocations of profits and cannot be brought into account as part of their costs or manufacture and sale. However, where any nucleus firm is able to show the Central Price Regulation Committee that the application of this general rule would make the nucleus firm substantially worse off financially than it would have been had it been permitted to continue production without concentration, the Committee will be prepared to consider relief. This relief will constitute allowance of a part of the nucleus firm's costs or expenses as a proper amount representing such part of the compensation payments as the nucleus firm may be able to prove is reasonably required for the purpose of providing for the irreducible expenses of the closed firm.

Under this general policy, where a compensation scheme works to the disadvantage of a nucleus firm, the Central Price Regulation Committee will give favorable consideration to price adjustments for the concern. In this country, such action might be taken by OPA in connection with such a plan to prevent undue hardship on the nucleus firm, although no final decision on such policy has been reached as yet.

Again, in instances where under a concentration plan a nucleus firm is liable to provide for the care and maintenance of the factory or any plant of a closed firm, and manufacture at cost for such firm which continues to act as a selling agent, the Central Price Regulation Committee has ruled that:

> *The nucleus firm may bring into account as part of its costs and expenses for the purposes of the Goods and Services Act, proper and reasonable amounts payable in respect of such care and maintenance, provided that account is also taken of the increased turnover resulting from concentration in calculating overhead expenses.*

In this instance, the Committee agrees to take into consideration additional cost elements, if the producer will take into consideration savings as a result of additional volume of manufacture.

Irreducible expenses of nucleus firms growing out of concentration arrangements have been defined by the Central Price Committee in instances where the firm produces at cost for the closed firm which continues to sell its owns products to include the following:

> *Rent or net annual value of the factory where the property is owned or occupied; rates; fire insurance; wear and tear on plant and machinery; wages of staff employed as caretakers, including fire watchers, or in connection with the care of idle machinery; payments for royalties or license fees on the manufacture of articles under agreements entered into before the date of the concentration scheme's taking effect (when payable to a subsidiary, associated business, director, or proprietor, the amount must be reasonable); materials for greasing and oiling machines used in normal upkeep; and cleaning and necessary maintenance of the factory.*

In cases where the nucleus firm is producing and selling for the closed firm which shuts down altogether, the following additional items may be considered irreducible expenses:

> *Rent or net annual value of the warehouse and offices where property is owned and occupied (appropriate amounts allowed for income taxes should be regarded as maximum); rates; cleaning and necessary maintenance of the warehouse and offices; cost of keeping books of account and making statutory returns; legal and accountancy charges; and war risk insurance on stocks.*

All of these items will be considered permissible expenses, under the specified circumstances, by the Central Price Regulation Committee. They may be included in determining maximum prices for which various items may be sold.

Concentration of the paper industry in the United States will present some interesting problems in connection with compensation arrangements because of the various types of operations involved. For example, an entirely different compensation arrangement might be required for assumption of production of a non-integrated firm by an integrated firm than would be required if both concerns were non-integrated. Allocations of profits (to use the terminology of British price decisions on the question) probably would be based on entirely different factors in the two cases.

One phase of the question which presents itself in connection with such an example is the method which might be used in computing relative costs of raw materials to the integrated firm, as compared with the costs to the non-integrated producer. If the integrated nucleus plant produces the required paper from pulpwood, whereas the non-integrated plant begins its operation with wood pulp, the nucleus plant probably will be required to compute the cost of wood pulp at the stage where the other firm would start its operation. Allocable profits, in such an instance, very likely, would be computed on the basis of costs from the wood pulp stage to finished product.

However, in this case, the question would still remain (a) as to whether the nucleus firm would be allowed a profit on its manufacture of wood pulp and (b) whether it should be allowed a transporation charge in pricing such wood pulp—in view of the fact that the closed firm would have paid such a charge.

As a result of such individual problems which face various phases of the paper and paper products industries, it is likely that details of compensation

arrangements will be left to the parties to agreements, but all such arrangements probably will be subject to approval of either WPB or OPA, depending upon whether or not the latter agency has an important voice in concentration.

Details of the specific role the various war agencies will play in the general scheme of concentration have not been worked out as yet, beyond the designation of a Concentration of Production Committee within WPB, of which Deputy Director of the Office of Civilian Supply Joseph L. Weiner is Chairman.

This committee will be responsible for the general policy in connection with concentration schemes, subject to approval of Chairman Nelson. Details of the plans, however, will be worked out within the various industry branches which are now at work on the problem.

Planning Organization

in the Groundwood Mill

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▸▸▸ CONSERVATION IN THE GROUNDWOOD MILL is dependent upon the functions maintained by its management. The saving of manpower, materials, and equipment, and the improvement of product are essential, not only during this particular period; they are essential at all times to maintain and assure economic operations.

In order to realize and appreciate fully the benefits of conservation, it is imperative to maintain some semblance of organization. The functions maintained by the groundwood mill management will determine the success or failure of the conservation program.

Employees appreciate fairness, and most of them look forward to a day of increased remuneration. It is believed possible to maintain organizational functions on a fair basis and at the same time assure each employee of promotion and increased remuneration on the basis of development.

A program recently released by William P. Witherow, president of the National Association of Manufacturers, is aimed at the problems which will confront industry during the postwar period. That these problems exist and will exist during that period indicates they might be of our own making and that possibly a corrective program, with application made as soon as possible, might alleviate any hazards which might develop. The Association's subcommittee urges management research to devise and suggest plans to relieve the pressure of adjustment during this coming period. Stabilization of employment must be effected for immediate adoption. There must develop "plans and methods for retraining the large number of employees who are now engaged in war production work."

It is believed employment can be stabilized and conservation effected through planned organization in the groundwood mill.

In the past few years, the increasing adoption of methods of organized management have been too obvious to escape attention. The development of new thought or theory of management requires a progressive outlook and an initial outlay which yields no immediate return. However, it is not too surprising that the initial development of managerial methods has been confined almost exclusively to a relatively few corporations capable of maintaining organizational structure and of providing it with functions. It is not too surprising either, that the more progressive concerns in the pulp and paper industry have established methods of perpetuating their management through the maintenance of educational facilities and other worth-while incentives. Nor is it surprising that their employer-employee relationship is more firmly established where the maintenance of incentives is a function of management.

The strongest incentive appealing to man is the possibility of advancement through education. There is no better method of stabilizing employment than to offer men the means of self-improvement and to maintain a system of promotion in fairness above reproach. Educational functions within an organization provide a means for employees to grow and nourish the vitality necessary for still greater future growth. A system of self-instruction, fostered through management, helps to perpetuate and strengthen a program of conservation.

Planning for organization is not the same as the recently applied term of upgrading in industry. Planning for organization is much more important, since both employees and management of the groundwood mill maintain plans beneficial to both.

The trained and qualified supervisor during this particular period is certainly at a premium. Will industry take the responsibility of making and training future management from the ranks of its present-day employees? Or must this responsibility be accepted by the trade-union organizations? It would appear that training within industry, whether by management or by the trade-union, would satisfy the demands for qualified future executives in the pulp and paper industry.

In carrying out this plan in the groundwood mill, each employee would be given an opportunity to advance to work of a more responsible nature and effective means would be provided so that employees might take advantage of these opportunities to secure additional knowledge, directly and indirectly, concerning the operation. Each employee of the groundwood mill would secure, through various stages of advancement, a thorough knowledge of mechanics and chemical engineering principles. The need for such training is obvious. The desire to learn, to accomplish, and to accept responsibility must be inculcated into each new employee; various mediums offering additional knowledge, such as the trade and trade-union associations

and their publications, would be brought to his attention. The responsibility of creating a desire for self-improvement would not be so much in the new employee himself, but would rest largely with groundwood management. Naturally, any new employee who did not respond to such opportunities, would serve no useful purpose in the groundwood mill in any capacity.

Personnel for the groundwood mill is best secured through advancement from other departments of the mill, or from those employees who indicate a sincere desire for this particular work. The merits of employment in the groundwood mill are many and the possibility of advancement offers just as great a future to the right man as do other departments within the industry. According to R. S. Kellogg, secretary, News Print Service Bureau, the continental production capacity of groundwood pulp is estimated in the neighborhood of 6,600,000 tons, excluding that of Newfoundland and Mexico.

Laboratory assistants and men with previous technical training are desirable recruits insofar as their background is concerned. However, practical men with a desire to work and learn are more desirable applicants to the groundwood mill. New employees should be accepted by the superintendent and then delegated to work under the control engineer. Under the engineer's supervision, the new employee would begin as a tester, learning groundwood pulp quality, pulp and operating standards, laboratory equipment, procedure of writing and maintaining reports, and methods of research.

A successful tester would indicate his desire to enter operations and his promotion would be dependent upon merit. His application to details and to the problems at hand, as well as his aptitude for study, would be determining factors in his advancement. Upon satisfactory assurance of a tester's desire to enter operations, he should be interviewed by the superintendent, who would then determine where the new operator would work.

Work for the new operator would entail:

1) Cleaning wood and studying wood technology and storage methods.

2) Screening pulp and learning the mechanics of screening.

3) Studying the principles of hydraulics and the use of water.

4) Pipe fitting and studying pipe sizes and flow velocities.

5) Experience in pump operation and becoming familiar with pumping principles.

6) Experience in the handling of

V. L. Tipka

motors and studying principles of electrical engineering.

7) Tending deckers and refiners and learning the principles governing the operation of deckers and the refining of slivers.

8) Maintenance of screen plates, belts, and bearings, and learning principles of metallurgy, particularly with reference to corrosion.

9) Studying the chemistry of wood and the action of white water on mill equipment.

10) Learning the principles of bacteriology and the propagation of organic matter.

11) Experience in grinder operation and learning the effects of temperature and all phases of pressure during grinding; the need for temperature, pressure, and consistency control; and the effects of jigging a stone.

In addition, the new operator would have learned through actual work, methods of hanging a stone, truing-up a stone, setting pockets, and the care and operation of all auxiliary equipment. This experience and training would qualify an operator for the position of foreman. He would be imbued with a desire to create and accomplish something for himself and the one responsible for making this training possible—his employer. He would recognize the value of the industry to himself, and would anticipate at all times ways and means to effect conservation. After an operator has been promoted to the position of foreman, he should know (and his employer should know likewise) that he merited advancement because he had obtained a fundamental knowledge of general mill problems, and that he was just beginning a groundwood education.

The need for organization and trained personnel is evident. Conservation alone demands a clear, clean-cut picture of operations. With the present shortage of manpower, management must know the responsibilities and activities of every employee in the organization, and recognize their ambitions as men. If methods of conservation are not suggested by employees, there is apparently good reason.

In the average groundwood mill today, 90 per cent of the personnel lacks a complete knowledge of company policy. It is safe to speculate the same percentage lacks a complete knowledge of the company's process variables, and a good percentage of the employees do not know the effects of their immediate work. Without education and training, how can management anticipate an effective conservation program?

There are many instances where no record is maintained of an employee's qualifications—good or bad. Equipment is too often installed with no record of direct maintenance, its product delivery, or whether the expenditure was justified. Stones are often installed with no record of stone life, tonnage made, cost per ton, the quality of pulp, or the amount of stone surface to be used. Hickling (Hickling, Frank J., "Costs for Paper Mill Executives," THE PAPER INDUSTRY AND PAPER WORLD, p. 275, June, 1942) describes a partial list of cost items of interest to the groundwood superintendent. His list could be carried still further with ways indicated to greater economies. Management is certainly interested in economies, but without organization and trained personnel, these economies remain hidden indefinitely until accidentally found. Organization points the way to real conservation.

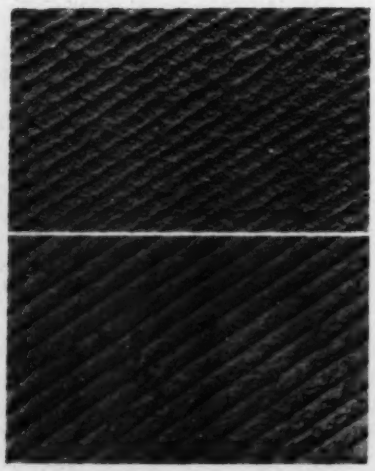
The foreman in the groundwood mill should be considered a junior executive. His duties are to execute the policies created or co-ordinated by the superintendent, as well as to maintain operations at their peak at all times. He, with the night superintendent and the control engineer, should be the only ones permitted to dress or jig the stones. Concentration of this responsibility in the hands of the junior executives is important. These men, through experience and training, have matured judgment to effect conservation and at the same time to maintain production.

The foreman, while junior in rank to the control engineer and the night superintendent, should accept the responsibility of teaching and guiding new operators in the various occupations, thus fostering the policy of the groundwood management. All operating and technical developments evolving from the groundwood laboratory, under the direction of the control engineer, should be discussed with the superintendent in the presence of

Case Studies of Various Pulpstone Dressings

Sandstone Experiment—Burr Used: (left) 9 cut 1½ in. lead—34 deg.; (center) 9 cut 2½ in. lead—34 deg.; (right) 9 cut 2½ in. lead—38 deg. Note angle of tooth. Pattern made with 34 deg. tooth angle is better than the pattern made by the 38 deg. angle. The higher angle and longer lead gives a less uniform surface and tends to rupture easily. Note fair evenness of pattern on the 9 cut 1½ in. lead—34 deg. tooth angle.

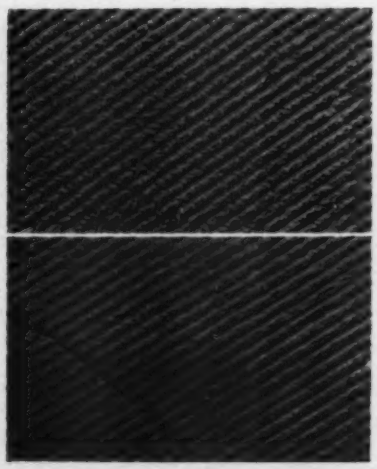
Artificial Stone Experiment: Left—Burrs used: Marking 2 cut 5 in. lead, covered with 12 cut 3 in. spiral. Difficult to obtain good pattern. Sound training and experience necessary. Not to be jigged too hard. Good dressing for fine pulp requiring low freeness. Fiber characteristics can be controlled. Center—Burr used: 9 cut spiral, 1½ in. lead. Right—Marked with 4 cut spiral—5 in. lead. Marking burr and dressed with 9 cut spiral—1½ in. lead.

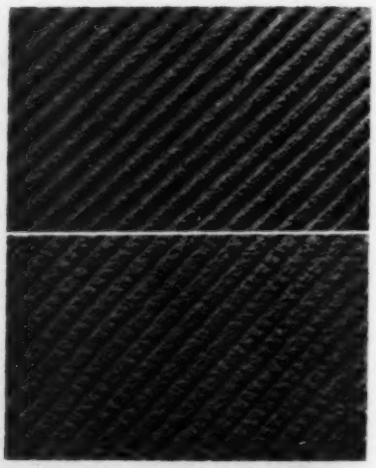


Above—Sandstone dressed with 9 cut 1½ in. lead spiral.

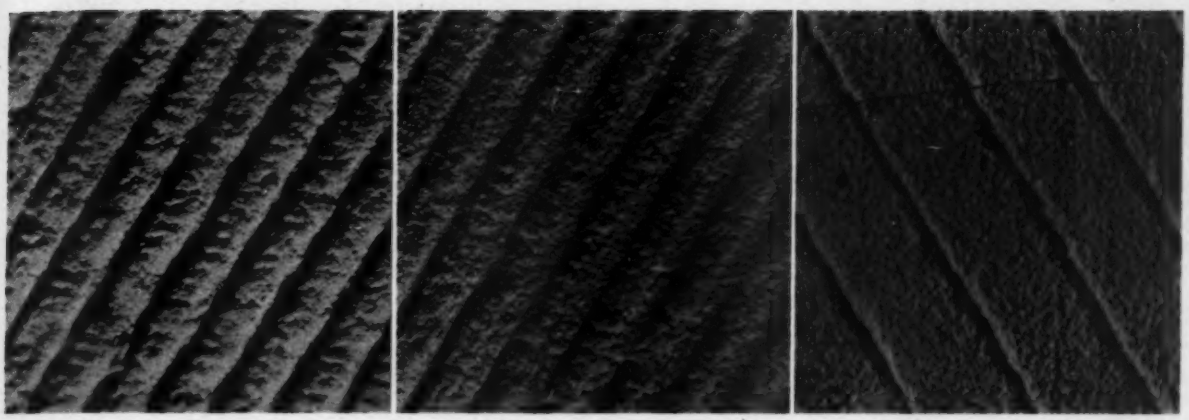
Below—Artificial stone dressed with 9 cut spiral—1½ in. lead rolled back with dull diamond burr.

Below: These two photographs were taken from the same artificial stone. Both illustrations show stones dressed with a 12 cut 1½ in. lead spiral burr. The upper illustration indicates the type pattern obtained when burr travel across the stone is in the proper direction. The lower one indicates breaking down of the pattern when the same spiral burr is applied in the wrong direction.

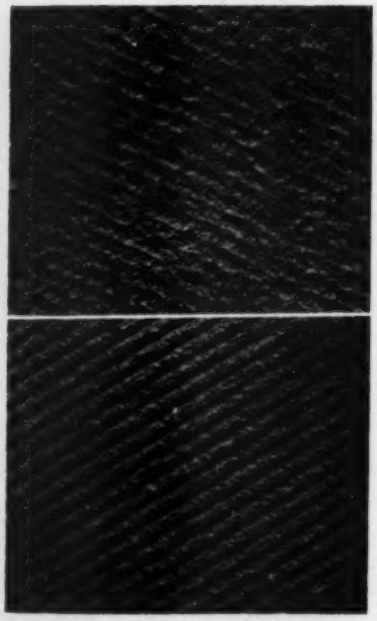




Artificial Stone: The stone above was dressed with 8 cut 3 in. lead spiral. Jigged too hard. Pulp from this pattern will contain high percentage of "flour" and freeness will be too low for good paper machine operation. Stone illustrated below is the same stone after having the 8 cut 3 in. spiral crossed with a 12 cut 1½ in. spiral. Note that top has been flattened and cutting surface increased, yielding pulp of higher freeness and increased production. This pattern reduced "flour" 37 per cent with final freeness of 87 CS.

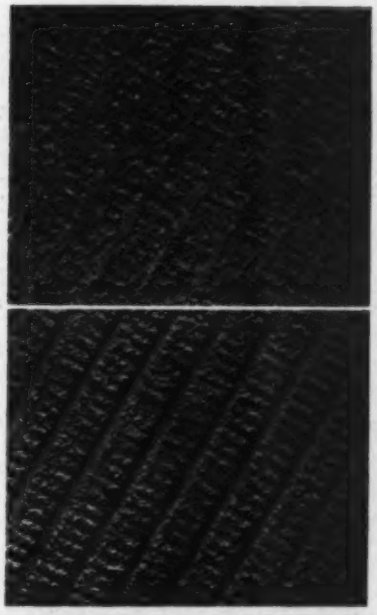


The illustration on the left indicates the results of jigging a sandstone with a 4 cut 5 in. marking burr and crossing it with a 14 diamond. Note irregular surface. The illustration in the center is the same sandstone jigged with the 4 cut 5 in. marking burr and crossed with a 10 cut 1½ in. spiral. Note that cutting surface is reduced and pattern is irregular. The illustration at the right indicates artificial stone jigged with 2 cut 5 in. marking burr and covering it with a 14 diamond. Note the increased grinding surface with this dressing.



Comparative Burr Patterns: Left: (above) Sandstone dressed with 10 cut 1½ in. lead spiral; (below) Artificial stone dressed with 10 cut 1½ in. lead spiral.

Right: (above) Sandstone dressed with a 4 cut 5 in. marking burr and crossed with a 12 cut 1½ in. lead spiral; (below) Artificial stone dressed with a 4 cut 5 in. marking burr and crossed with a 12 cut 1½ in. lead spiral.



the foreman and the night superintendent. In this way, all supervision becomes acquainted with developments and new standards concerning this operation.

No other position in the groundwood mill offers more opportunity to exercise initiative than that of the control engineer. Advancing from the position of the foreman, he fulfills the duties of a foreman, and at the same time directs the functions of the groundwood laboratory under the supervision of the superintendent. Promotion to this position through merit assures management of capable direction of its research and standardization problems. The control engineer is in a position to foster the policy of education and self-improvement to the extent of supervising the educational program of the groundwood management; he should correct all written examinations and, guide the new operators in their technical studies. He may interpret and evaluate all technical releases of the various trade associations concerning particularly the operations of the groundwood mill. He should submit a monthly report to the superintendent covering all work accomplished during the past month; the progress of the work in process; and, any new thought relative to development problems. In this report the control engineer would account for all time devoted to special problems by the testers under his supervision and make comment regarding the new operators with their various studies.

Records should be maintained of stones in storage, stone grit classification, stones being used, and the reason for removing a stone. With this would be a record of each stone: (a) its jigging cycle, (b) the cost per jig, (c) total tons of pulp ground, (d) cubic inches of stone per jig, (e) tons of pulp per jig, (f) the quality of pulp, (g) other pertinent data relative to operation and life. Not only would stone life be measured and accounted for, other equipment including pumps, packings, belts, motors, bearings, screens, save-alls, refiners, etc., would be recorded and maintenance costs maintained.

While a general picture of this plan might tend to create record consciousness, it is not intended for that purpose. The main purpose of maintaining complete records is to indicate to

management the trend of operating costs and to create a cost consciousness in the minds of all employees. The experience gained in directing this work would qualify the engineer for the more responsible position of night superintendent.

The night superintendent should carry out the direct policies of the groundwood management, supervising operations in the absence of the superintendent and directing the personnel during the night. He is directly responsible to the groundwood management.

The real job of conserving manpower, materials, and equipment, and the improvement of groundwood quality standards, rests with the groundwood superintendent. Planned organization will help him to do the job better and aid him in carrying out the general policies of the administrative officers of the company. He should maintain close contact with the company management, the paper mill supervision, the company purchasing system, the mill storeroom, the plant engineer and master mechanic. He should see that new experiments are tried and old equipment discarded and salvaged. He must know what to choose of the new developments and what to retain of the old. He should interview all prospective employees furnished through the personnel manager and explain to each the actual prospects of a thorough education in groundwood production.

The superintendent should direct the policy of management and supervise the direction of the groundwood laboratory. His monthly report to the company management would cover the developments of the laboratory and the benefits of these developments to the operation; the development work in process and the status of its completion; and, contemplated work for the future. He should see that equipment is maintained clean and in safe operating condition; he should maintain a budget and frequently discuss prospective expenditures with the company management.

All new installations should be checked to determine actual savings resulting and compared with the previously determined estimates. Close contact with the paper mill supervision is essential, since pulp quality to the paper machines must be kept uniform and within established specifications for efficient paper mill operation. The superintendent should determine daily the amount of fiber loss in the white water overflow, if any, and the amount of good usable fiber in the rejects if they are not refined. He should keep abreast of all developments in this particular field and discuss with trade representatives the various characteristics of their products, with thought of application to his own operations. There is no more difficult job in the groundwood mill than that of superintendent. It requires experience and training, matured judgment, and planned organization, to effect the economies and improvements expected today.

The control of groundwood quality and process variables is a function of the groundwood laboratory and, for various reasons, should be separated from the main mill laboratory. It would be a unit serving a definite purpose and the maintenance of it would be borne by the groundwood mill. Its work should be of such nature that the results would justify its existence. Development and research problems would be conducted in the laboratory and carried to the mill for final completion. This work would entail further investigations of wood variables; stone operating variables; bleaching and brightening of groundwood pulp; screen mechanics and water-consistency variables; studies of refiner action and variables; jigging methods; and, other justified problems.

Testers would be instructed to make any determination requested by the operating supervision. These tests may vary from routine freeness values to fractionation determinations. Tests would be made both before and after jigging to note the extent of the jig, and this, too, would be recorded. Testers should maintain reports of all variable items in the mill. Instrument charts should be checked and filed daily in the control engineer's office where they then serve for statistical purposes. Instruments of a recording nature must be maintained in proper condition through the plant engineering department.

While individual or "spot" tests of groundwood pulp quality serve a routine purpose, they have little significance to operating characteristics of the pulp on the paper machine. The application of statistical methods of analysis indicates more clearly an expectancy of operating properties on the paper machine.

Knowing how and when to dress a stone is important knowledge in the groundwood mill. Practice varies from mill to mill due, principally, to wood variables and the quality of pulp desired by the paper mill. However, there appears to be no work in the grinder room more important than the dressing of stones. The art of jigging is acquired through experience. When jigging cost varies over a fairly wide range, it becomes evident why this responsibility is concentrated in the hands of only the junior executives. Pulp quality as well as stone cost is important, and improper jigging is evidenced by the tests taken before and after dressing the stone.

Too few groundwood men appreciate the importance of proper jigging and the importance of maintaining jigging equipment in perfect condition.

Lathes should be in perfect alignment and work smoothly without jerking.

Mandrels should be solid and old bushings or bearings renewed. Bushings, bearings, and pins should be well lubricated during the complete jigging cycle.

The mandrel and burr should fit into the fork snugly and without endplay.

Most important of all, stones should never be over-jigged. Jigging should be as light as possible, especially where artificial stones are in use.

The longest interval between dressing should be desired. Long intervals between jigs reflect low stone cost per ton and maintenance of pulp quality. Production is not materially affected.

Right hand leads should be started from the right of the stone and left hand leads from the left. Running a right hand lead from the left side of the stone breaks down the pattern impression. The same is true starting a left hand lead from the right.

In order to effectively emphasize the importance of jigging to the new operators, case studies of various dressings should be used in discussions of the characteristics of each jig. The accompanying illustrations show a number of such case studies.

The results of maintaining organization in the groundwood mill, where a system of promotion and educational incentives are functions of management, will be reflected in stabilized employment, improved employer-employee relationship, lower conversion costs, and improved operations. With planned organization, each and every employee will feel the importance of his niche in the management structure and realize that through mental application and untiring effort, advancement and increased remuneration will be more certain. Any plan, considered or devised for the postwar period, or for that matter today, must be definite in purpose and specific in its application. Evasive attitude, indecisive thought, indifference to the future, and unorganized management, will not survive the postwar period.

Main floor of power house. Fig. 1 (left)—G-E turbo-generator units and switchboard. Fig. 2 (right)—Metal-enclosed switchboard.

A Completely-Electrified Paper Mill

C. E. MILLER[1] and FRANK A. PESCHL[2]

THE SOURCE OF everyday commodities draws little consideration from the average individual until he is deprived of something he has accepted as a part of his existence. However, it is fortunate for the masses that there are invariably some persons who are endowed with the foresight to anticipate such a condition and who have the courage to do something about it.

Such foresight and courage may be attributed to Harry H. Straus, president of the Ecusta Paper Corporation, Pisgah Forest, North Carolina. For many years Mr. Straus had worked toward the goal of making the American cigarette a wholly domestic article because almost all of the cigarette paper was then imported from France. In 1938, he founded the Ecusta Paper Corporation to fill the needs of American cigarette manufacturers and smokers for cigarette paper manufactured in the United States.

A review of the situation which existed prior to the establishment of this company will explain many of the obstacles it was necessary to overcome before attention could be directed to actual production.

All cigarette paper manufactured in France was made from linen rags. This procedure was not feasible in this country (1) because of an insufficient supply of linen rags; and (2) because of the cost of collecting rags, even if they were available. Consequently, in an effort to overcome this obstacle, Mr. Straus started experimenting to develop a process for making cigarette paper direct from seed flax. It was not until 1937, after four years of extensive research, that his efforts were rewarded to the extent that consideration could be given to the commercial production of cigarette paper.

Many factors had to be considered in selecting a plant site. Of primary importance was the water supply, since a large amount of pure water was essential. After consideration of all factors involved, Pisgah Forest, North Carolina, was selected as the most suitable location for this plant.

Work on the new plant was started in June, 1938, based on an initial installation of four paper machines and associated equipment. One year later, experimental production was started. Shortly thereafter, the plant went into regular production. Regular production was hardly well under way when it was quite apparent that the existing capacity of domestic sources was inadequate to supply the demands of the cigarette manufacturers. In order to meet this demand for cigarette paper, an expansion program, involving four additional paper machines, was planned and completed. All eight machines are now in regular production and are adequate to take care of a very sub-

(1) Industrial engineering department, General Electric Company; (2) General manager, Ecusta Paper Corporation.

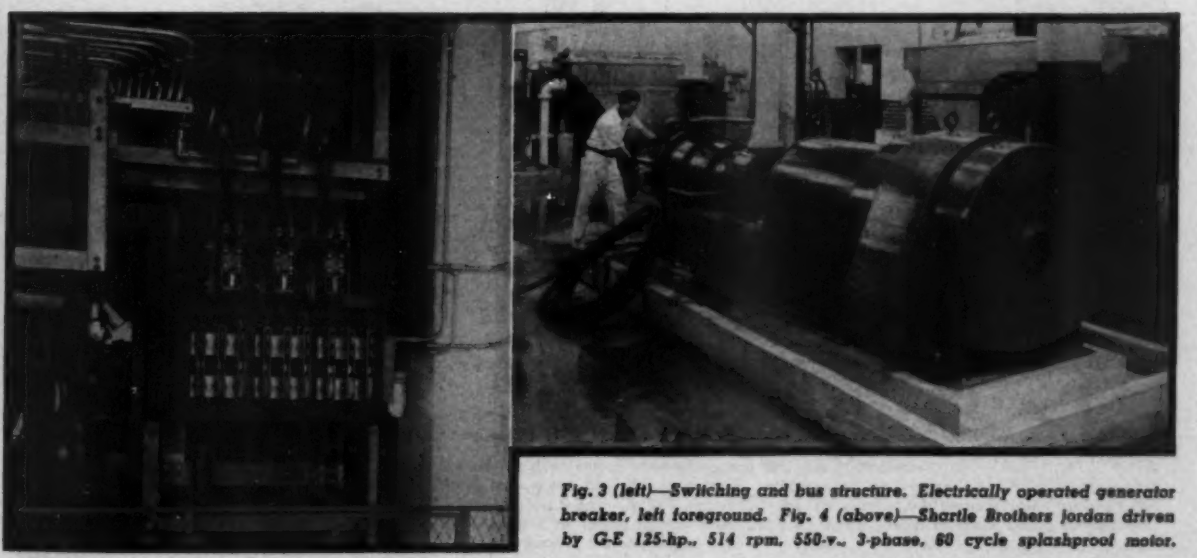


Fig. 3 (left)—Switching and bus structure. Electrically operated generator breaker, left foreground. Fig. 4 (above)—Shartle Brothers jordan driven by G-E 125-hp., 514 rpm, 550-v., 3-phase, 60 cycle splashproof motor.

stantial part of the cigarette paper requirements of the United States.

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The generating equipment consists of two turbo-generating units (Figure 1) one rated 2,000-kw., 2500-kv.-a., 0.8 power-factor, and the other 4,000-kw., 5,000-kv.-a., 0.8 power-factor. Both units are of the automatic extraction condensing type, designed for operation at 400 lb. gauge steam pressure at the throttle, 700 Fahr. total temperature, 2 in. absolute back pressure, and 75 lb. gauge extraction.

Power is generated and distributed at 600 volts, 3 phase, 60 cycle. Distribution to the various load-centers is made through metal-enclosed switchgear equipped with drawout-type air circuit breakers (Figure 2). Each of 36 feeders is protected by air circuit breakers, manually operated, trip free, with time-delay overcurrent protection, and instantaneous short circuit protection. The incoming line and generator breakers are also air circuit breakers, but are electrically operated and are mounted remote from the main switchboard (Figure 3). A station battery provides power for operating the electrically-operated breakers.

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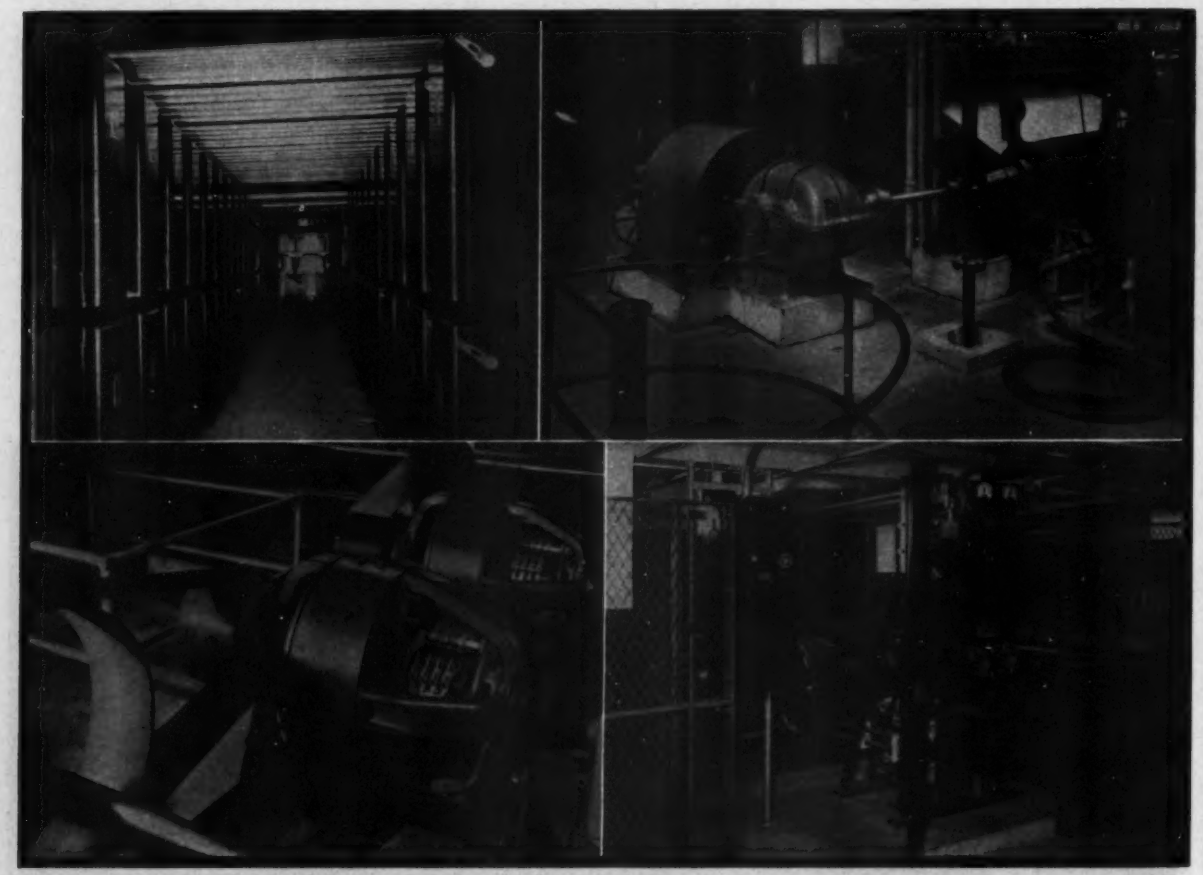

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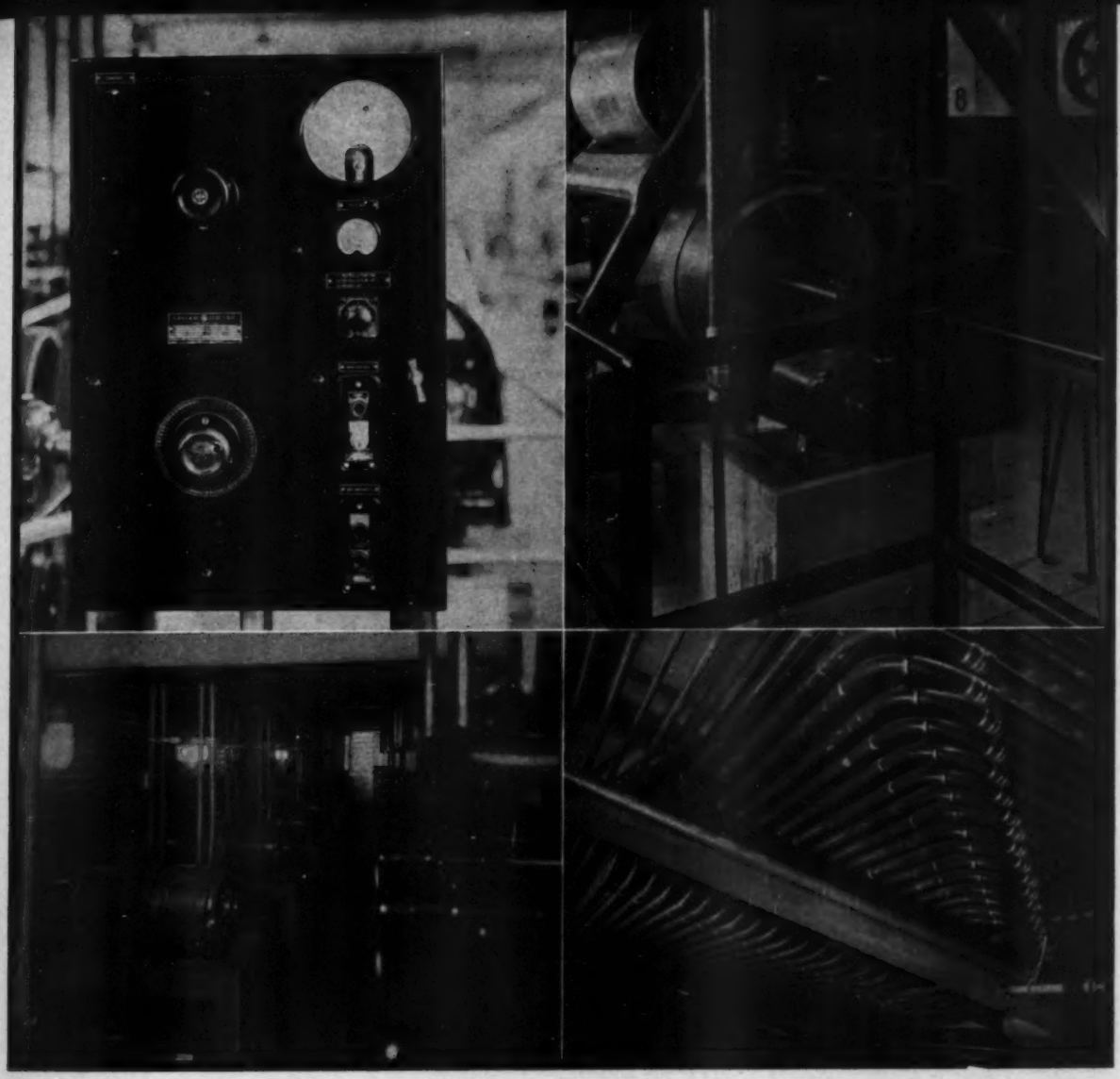

ABOVE: Fig. 9 (left)—G-E operator's control board for single-motor paper-machine drive. Fig. 10 (right)—G-E Alnico permanent magnet pilot generator rated 1 ampere, 250-volt, 3,000-rpm, chain driven from backline shaft of paper machine. BELOW: Fig. 11 (left)—G-E Speed Variators, Motor-generator sets and control. Fig. 12 (right)—Conduit installation, power and control circuits from the Speed Variator room to the driving motors.

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Each paper machine is driven by a single motor drive of the direct-current, adjustable-voltage type with a 4 to 1 speed range. Each drive consists of a main driving motor (Figure 7), rated 60 hp., 1,150 rpm, 230 v.; a 50-kw., 250-v. induction-motor driven motor-generator set with direct-connected exciter; induction-motor starter; adjustable-voltage d-c. control panel; automatic speed-regulating equipment; and operator's control panel.

The motor-generator set with starter and the a-c. control panel are located remote from the machine room in a clean, dry place (Figure 8). The operator's control panel (Figure 9), is located near the paper machine convenient to the operator. The control provides automatic preset speed and automatic wash-up speed control. Assuming the MG set is running, the operator presses the start button on the operator's panel to start the drive on low voltage after which it automatically accelerates to the preset speed as determined by the setting of the speed-

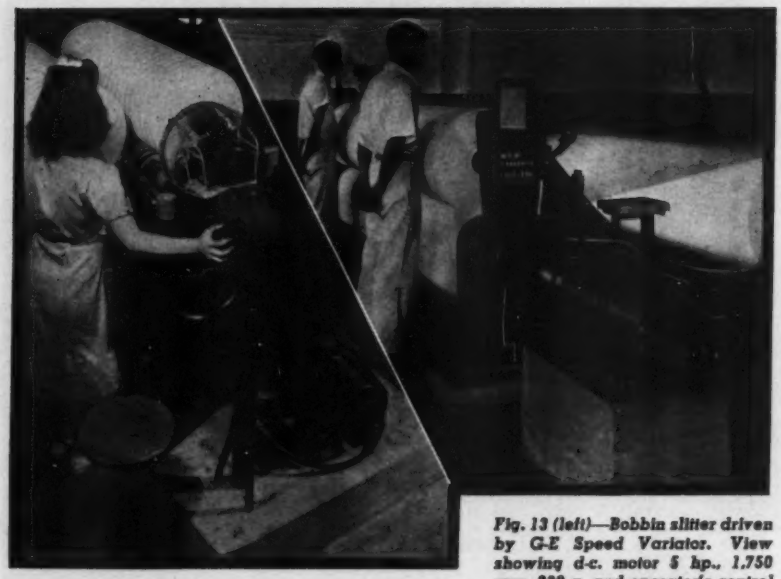

Fig. 13 (left)—Bobbin slitter driven by G-E Speed Variator. View showing d-c. motor 5 hp., 1,750 rpm, 230 v. and operator's control station. Fig. 14 (right)—Rewinder driven by G-E Speed Variator d-c. gear motor in foreground, 5 hp., 144 rpm. 230 v. Operator's control station shown.

adjusting rheostats also located on the operator's panel.

There are two speed-adjusting rheostats, one coarse and one vernier to allow fine speed adjustment. If, while the machine is running at normal operating speed, it is desired to decelerate to wash-up speed, the operator has only to turn the control switch on the operator's panel to the wash-up position after which the drive automatically decelerates to wash-up speed and is still under the control of the automatic speed regulator. This makes it unnecessary to disturb the setting of the speed-adjusting rheostats at any time except when the normal operating speed is changed.

If, for any reason, it is desired to operate without the automatic speed-regulating equipment, this may be done by turning the control switch on the operator's panel to the regulator off position. The speed of the drive is then controlled by means of the RAISE-LOWER push buttons on the operator's panel, and when the drive is stopped, the control interlocking is such that the generator voltage is automatically reduced to a suitable value for the next start. However, when operating without the speed regulator, upon again starting the drive it is necessary for the operator to hold the RAISE button depressed until the desired speed is reached.

The automatic speed-regulating equipment consists essentially of an Alnico permanent magnet pilot generator, of "Diactor" generator-voltage regulator with its rheostatic element connected directly in the generator field, and a motor-operated, follow-up generator field rheostat.

The pilot generator (Figure 10), is driven from the backline shaft and provides a signal voltage for the regulator proportional to machine speed. Any change in speed of the backline shaft, therefore, causes a proportional change in pilot generator voltage. Any change in pilot generator voltage unbalances the regulator in the proper direction to restore the speed of the backline shaft to normal.

The motor-operated generator field rheostat is controlled by follow-up contacts on the regulator. However, there is sufficient range in the direct acting rheostatic element of the regulator to take care of speed regulation under normal operating conditions. This arrangement makes for greater accuracy and stability because only 20 per cent of the total range need be covered by the direct-acting rheostatic element of the regulator to take care of normal conditions. Consequently, for this small range the direct-acting rheostatic element gives practically stepless control. The motor-operated generator field rheostat is actuated by the regulator only in the case of abnormal conditions such as severe load changes, sustained variations in power-supply voltage or frequency, and also during starting and stopping operations.

The paper, approximately 8 feet wide, leaves the paper machines wound in large rolls. It is then rewound and inspected. Any defective paper is removed and the rewound rolls are then ready for the finishing departments. In the finishing departments some of the paper is converted into suitable form for shipping to the cigarette manufacturers; the remainder is converted into booklets for "roll your own" cigarettes. The paper for cigarette manufacturers is slit to widths of somewhat over one inch and wound onto bobbins, in which form it is ready for use in the automatic cigarette making machines.

The rewinders, bobbin slitters, gumming machines, printing presses, and embossing machines are driven by individual d-c. adjustable voltage Speed Variator drives, each consisting of a d-c. motor, MG set, and variable voltage control. There are 46 Speed Variator drives totaling in excess of 230 hp., which range in rating from 2 hp. to 10 hp. each. All have an operating speed range of 8 to 1. The speed is readily adjustable throughout this range by means of one control knob located convenient to the operator. Fifteen of these drives deliver their power through gear-motors giving output speeds suitable for direct connection to the driven machines.

Twenty-two of these drives depart from the standard in that one control knob starts, adjusts speed, and stops the drives, thus eliminating the customary START-JOG-STOP push buttons, but still maintaining the instantaneous overload and undervoltage protective features. Control features are incorporated in some of the drives to limit the stalled motor torque to a specific value.

In order to keep as much as possible of the Speed Variator equipment out of the mill proper, all of the motor-generator sets, their starters, and the d-c. control panels are located in a central room (Figure 11). In this room, the motor-generator sets are arranged in two long rows separated by steel panels mounting the starters and d-c. control. From this room, the power and control conduits (Figure 12), lead out in a neat series of runs to the d-c. driving motors and the operator's control, on each machine. This leaves only the essential apparatus, consisting of the driving motor and operator's controls, to take up production space around the driven machine. Figures 13 and 14 show two typical installations.

The Ecusta Paper Corporation's plant is another outstanding example of American industry's progressiveness in solving difficult problems and swinging into full production in a remarkably short time, so that the consuming public may rest assured there will be no shortage of cigarette paper.

The electrical layouts were made by the electrical department of J. E. Sirrine & Company, engineers in Greenville, South Carolina, and all the electrical installations were executed by Huntington & Guerry, electrical contractors in Greenville, South Carolina.

Classification and Properties of Dyestuffs and Pigments

III—PIGMENT COLORS and SULPHUR COLORS

E. R. LAUGHLIN, Technical Laboratory
E. I. du Pont de Nemours & Company, Inc.

PIGMENT COLORS

The pigment colors are among the oldest coloring materials known. They were employed by the ancient Greeks, Romans, and Egyptians as established by the pots of Yellow Ocher recovered from the pyramids of Egypt and the ruins of Pompeii.

In the paper industry, pigments are used extensively in beater dyeing as well as in coating. Some products are used exclusively in the beater, some exclusively for coating, and others for both.

It is not intended to include all the pulp colors employed in the coated paper industry. Rather, the following remarks will be confined to the pigments used in beater dyeing, some of which also find use in coating.

Two-sidedness

All pigment colors have one dyeing property in common. They produce extremely two-sided sheets, especially if the paper is heavier than a tissue grade and run at any speed which could be considered moderately fast for the particular grade.

The faster the machine speed, the more pronounced the two-sidedness, all other conditions being equal. Also, the use of suction couch and suction press rolls increases the two-sided effect.

This two-sidedness is not confined to coloring matters alone. There is two-sidedness of sizing, and also of furnish. Most fourdrinier sheets are harder sized on the felt side, and short fibers and fines, which are held in the sheet, are concentrated on the same side. Furthermore, sheets containing a filler, such as clay, calcium carbonate or titanium dioxide, unless specially treated or formed, contain an appreciably higher concentration of filler on the top or felt side. It is apparently a natural consequence of the mechanics of sheet formation on a fourdrinier machine that any insoluble relatively finely divided material (such as fine fibers, fillers, or precipitated size) tends to be removed from the wire side and is concentrated on the top side, perhaps as a result of the natural filtering process attendant to dewatering.

The precise mechanism of color two-sidedness is not known; but it is certain that two-sidedness and chemical constitution of the dyestuff are not at all related. Apparently, the only generalization that can be made regarding two-sidedness (which is without an exception), is that all pigments will give two-sided results and are worse than any other class of coloring materials in this respect. It is possible that this phenomenon is associated with lack of affinity for the fiber. Pigment colors have absolutely no affinity and are not retained unless alum is used, except for a small amount which may be had mechanically. However, acid colors have no affinity for cellulose either. Of the acid colors, Nigrosine is extremely two-sided—as bad as any pigment, while Brilliant Crocein FL (Azo acid class) is perhaps the least two-sided of any dyestuff. Furthermore, it cannot be established that particle size in aqueous solution is a factor. True, the pigments, even the highly dispersed ones, are extremely colloidal, as is Nigrosine; but so is Brilliant Crocein FL, which is one of the few acid colors which definitely does not form a mono-molecular solution. Nor are all of the so-called non-two-sided colors in the acid class. Brilliant Paper Yellow and Fast Red 8BL are direct types. Also, it is not possible to relate two-sidedness to degree of solubility.

Without doubt the factors governing two-sidedness relate very little to the chemical or physical properties of the colors alone or in aqueous solution. On the contrary, they probably are a function of the physical conditions of the system composed of color, fiber, size, and alum (since most problems of two-sidedness occur in sized paper). These factors might include such items as the electro-kinetic charge on the color-alumina or color-size-alumina agglomerate which, in turn, would govern the degree of retention on the fiber. However, distribution of the color on the various fibers of the furnish is unquestionably an important cause of two-sidedness. Recent work has shown that the reason sheets are two-sided is because the "fines" (or extremely small fibers), retained to a greater extent on the top side of the sheet, are more deeply colored than the rest of the furnish. The reasons for this selective coloring are not clear, but additional work has established that, in the case of the so-called non-two-sided dyestuffs, the preferential retention on the fines is very much less than for those colors which are notoriously two-sided.

To return to the discussion of the properties of pigments: It may be further stated that, in addition to being water insoluble, requiring alum for retention and producing extreme two-sidedness, most pigments are also weak tinctorially. Consequently, the production of deeper shades requires so much material that the pigment acts as a filler and weakens the sheet physically.

On the other hand, pigments generally possess good light fastness (some classes are considered permanent), and general all-around fastness to other destructive influences, such as chlorine, acid, or alkali (with certain exceptions); and they impart considerable opacity to the paper.

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EDITOR'S NOTE: This is the final installment of Mr. Laughlin's article. Part I on the subject of basic dyes appeared in the August issue; Part II covering acid colors—direct colors and their dyeing mechanism was published last month.

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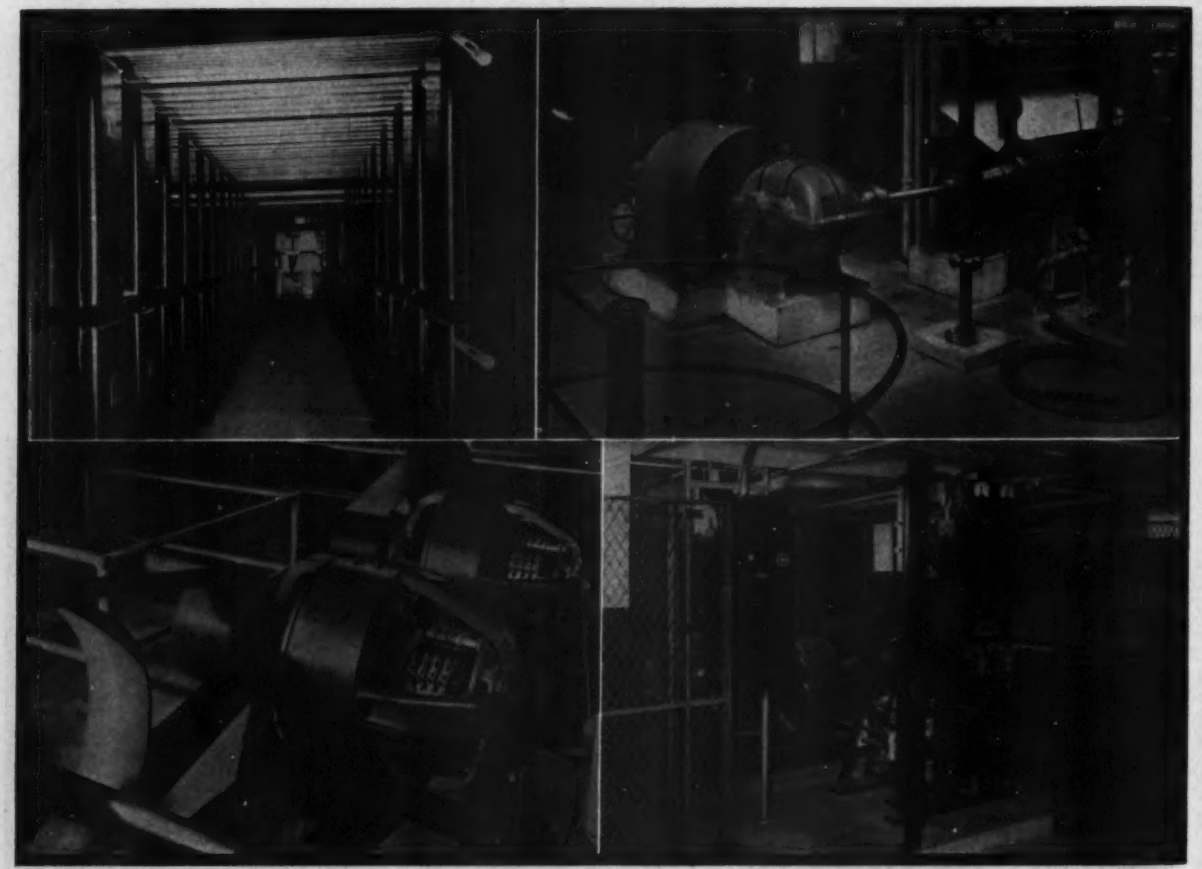

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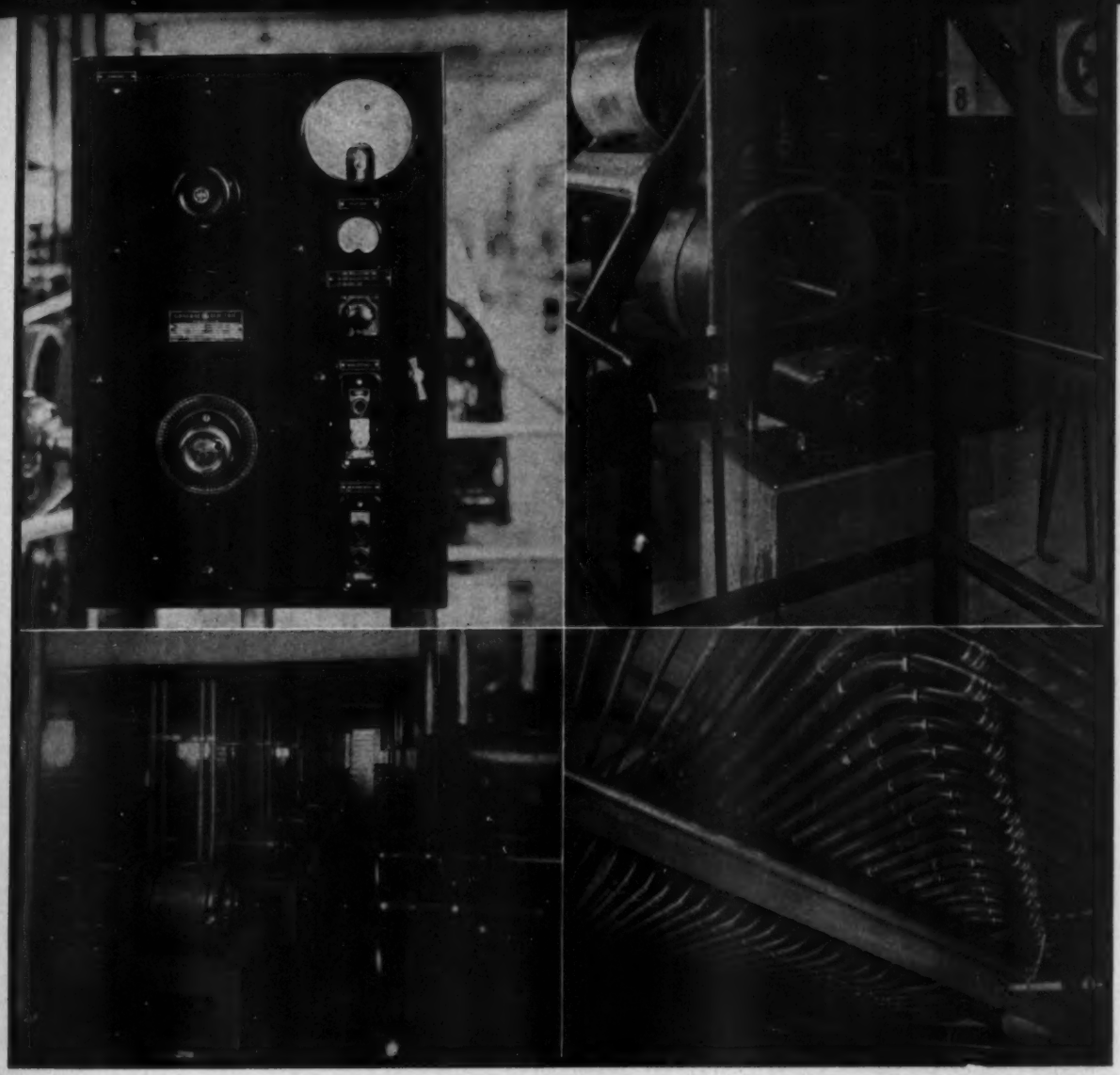

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The automatic speed-regulating equipment consists essentially of an Alnico permanent magnet pilot generator, of "Diactor" generator-voltage regulator with its rheostatic element connected directly in the generator field, and a motor-operated, follow-up generator field rheostat.

The pilot generator (Figure 10), is driven from the backline shaft and provides a signal voltage for the regulator proportional to machine speed. Any change in speed of the backline shaft, therefore, causes a proportional change in pilot generator voltage. Any change in pilot generator voltage unbalances the regulator in the proper direction to restore the speed of the backline shaft to normal.

The motor-operated generator field rheostat is controlled by follow-up contacts on the regulator. However, there is sufficient range in the direct acting rheostatic element of the regulator to take care of speed regulation under normal operating conditions. This arrangement makes for greater accuracy and stability because only 20 per cent of the total range need be covered by the direct-acting rheostatic element of the regulator to take care of normal conditions. Consequently, for this small range the direct-acting rheostatic element gives practically stepless control. The motor-operated generator field rheostat is actuated by the regulator only in the case of abnormal conditions such as severe load changes, sustained variations in power-supply voltage or frequency, and also during starting and stopping operations.

The paper, approximately 8 feet wide, leaves the paper machines wound in large rolls. It is then rewound and inspected. Any defective paper is removed and the rewound rolls are then ready for the finishing departments. In the finishing departments some of the paper is converted into suitable form for shipping to the cigarette manufacturers; the remainder is converted into booklets for "roll your own" cigarettes. The paper for cigarette manufacturers is slit to widths of somewhat over one inch and wound onto bobbins, in which form it is ready for use in the automatic cigarette making machines.

The rewinders, bobbin slitters, gumming machines, printing presses, and embossing machines are driven by individual d-c. adjustable voltage Speed Variator drives, each consisting of a d-c. motor, MG set, and variable voltage control. There are 46 Speed Variator drives totaling in excess of 230 hp., which range in rating from 2 hp. to 10 hp. each. All have an operating speed range of 8 to 1. The speed is readily adjustable throughout this range by means of one control knob located convenient to the operator. Fifteen of these drives deliver their power through gear-motors giving output speeds suitable for direct connection to the driven machines.

Twenty-two of these drives depart from the standard in that one control knob starts, adjusts speed, and stops the drives, thus eliminating the customary START-JOG-STOP push buttons, but still maintaining the instantaneous overload and undervoltage protective features. Control features are incorporated in some of the drives to limit the stalled motor torque to a specific value.

In order to keep as much as possible of the Speed Variator equipment out of the mill proper, all of the motor-generator sets, their starters, and the d-c. control panels are located in a central room (Figure 11). In this room, the motor-generator sets are arranged in two long rows separated by steel panels mounting the starters and d-c. control. From this room, the power and control conduits (Figure 12), lead out in a neat series of runs to the d-c. driving motors and the operator's control, on each machine. This leaves only the essential apparatus, consisting of the driving motor and operator's controls, to take up production space around the driven machine. Figures 13 and 14 show two typical installations.

The Ecusta Paper Corporation's plant is another outstanding example of American industry's progressiveness in solving difficult problems and swinging into full production in a remarkably short time, so that the consuming public may rest assured there will be no shortage of cigarette paper.

The electrical layouts were made by the electrical department of J. E. Sirrine & Company, engineers in Greenville, South Carolina, and all the electrical installations were executed by Huntington & Guerry, electrical contractors in Greenville, South Carolina.

Classification and Properties of Dyestuffs and Pigments

III—PIGMENT COLORS and SULPHUR COLORS

E. R. LAUGHLIN, Technical Laboratory
E. I. du Pont de Nemours & Company, Inc.

PIGMENT COLORS

The pigment colors are among the oldest coloring materials known. They were employed by the ancient Greeks, Romans, and Egyptians as established by the pots of Yellow Ocher recovered from the pyramids of Egypt and the ruins of Pompeii.

In the paper industry, pigments are used extensively in beater dyeing as well as in coating. Some products are used exclusively in the beater, some exclusively for coating, and others for both.

It is not intended to include all the pulp colors employed in the coated paper industry. Rather, the following remarks will be confined to the pigments used in beater dyeing, some of which also find use in coating.

Two-sidedness

All pigment colors have one dyeing property in common. They produce extremely two-sided sheets, especially if the paper is heavier than a tissue grade and run at any speed which could be considered moderately fast for the particular grade.

The faster the machine speed, the more pronounced the two-sidedness, all other conditions being equal. Also, the use of suction couch and suction press rolls increases the two-sided effect.

This two-sidedness is not confined to coloring matters alone. There is two-sidedness of sizing, and also of furnish. Most fourdrinier sheets are harder sized on the felt side, and short fibers and fines, which are held in the sheet, are concentrated on the same side. Furthermore, sheets containing a filler, such as clay, calcium carbonate or titanium dioxide, unless specially treated or formed, contain an appreciably higher concentration of filler on the top or felt side. It is apparently a natural consequence of the mechanics of sheet formation on a fourdrinier machine that any insoluble relatively finely divided material (such as fine fibers, fillers, or precipitated size) tends to be removed from the wire side and is concentrated on the top side, perhaps as a result of the natural filtering process attendant to dewatering.

The precise mechanism of color two-sidedness is not known; but it is certain that two-sidedness and chemical constitution of the dyestuff are not at all related. Apparently, the only generalization that can be made regarding two-sidedness (which is without an exception), is that all pigments will give two-sided results and are worse than any other class of coloring materials in this respect. It is possible that this phenomenon is associated with lack of affinity for the fiber. Pigment colors have absolutely no affinity and are not retained unless alum is used, except for a small amount which may be had mechanically. However, acid colors have no affinity for cellulose either. Of the acid colors, Nigrosine is extremely two-sided—as bad as any pigment, while Brilliant Crocein FL (Azo acid class) is perhaps the least two-sided of any dyestuff. Furthermore, it cannot be established that particle size in aqueous solution is a factor. True, the pigments, even the highly dispersed ones, are extremely colloidal, as is Nigrosine; but so is Brilliant Crocein FL, which is one of the few acid colors which definitely does not form a mono-molecular solution. Nor are all of the so-called non-two-sided colors in the acid class. Brilliant Paper Yellow and Fast Red 8BL are direct types. Also, it is not possible to relate two-sidedness to degree of solubility.

Without doubt the factors governing two-sidedness relate very little to the chemical or physical properties of the colors alone or in aqueous solution. On the contrary, they probably are a function of the physical conditions of the system composed of color, fiber, size, and alum (since most problems of two-sidedness occur in sized paper). These factors might include such items as the electro-kinetic charge on the color-alumina or color-size-alumina agglomerate which, in turn, would govern the degree of retention on the fiber. However, distribution of the color on the various fibers of the furnish is unquestionably an important cause of two-sidedness. Recent work has shown that the reason sheets are two-sided is because the "fines" (or extremely small fibers), retained to a greater extent on the top side of the sheet, are more deeply colored than the rest of the furnish. The reasons for this selective coloring are not clear, but additional work has established that, in the case of the so-called non-two-sided dyestuffs, the preferential retention on the fines is very much less than for those colors which are notoriously two-sided.

To return to the discussion of the properties of pigments: It may be further stated that, in addition to being water insoluble, requiring alum for retention and producing extreme two-sidedness, most pigments are also weak tinctorially. Consequently, the production of deeper shades requires so much material that the pigment acts as a filler and weakens the sheet physically.

On the other hand, pigments generally possess good light fastness (some classes are considered permanent), and general all-around fastness to other destructive influences, such as chlorine, acid, or alkali (with certain exceptions); and they impart considerable opacity to the paper.

The classification of pigments is a

EDITOR'S NOTE: This is the final installment of Mr. Laughlin's article. Part I on the subject of basic dyes appeared in the August issue; Part II covering acid colors—direct colors and their dyeing mechanism was published last month.

matter on which unanimity of opinion is lacking. On other occasions the author has used the following system which is perhaps as convenient as any.

XIX—Natural Earth Pigments

1267 Ocher, Yellow Ocher, Sienna
1305 Umber, Burnt Umber, Mineral Brown
1276 Red Oxide, Venetian Red, Iron Oxide
1303 Sap Brown

With the exception of Sap Brown, these products are all oxides or hydroxides of iron in various degrees of hydration. The Umbers and Siennas contain manganese. The wide variety of shades encountered is dependent upon the locality of occurrence and the degree to which they may have been calcined, or, to state it another way, the shade is influenced by the content of oxides other than iron as well as by the degree of hydration of the iron oxides. It ranges from yellow for the highly hydrated oxides, through brown for those containing manganese, to red for the least hydrated types.

These products are considered permanent to light, and are extremely fast to acids, alkalis, and chlorine. They are weak tinctorially, and exert considerable abrasive action on wires and slitter and cutter knives.

Sap Brown is an exception to all these properties. It is included in the group merely because it occurs naturally in brown coal and peat deposits in the form of humus and humic acids, produced mainly from the decay of vegetation. The alkali soluble material is extracted and evaporated to dryness.

Sap Brown is perhaps not a true pigment but reacts like one in beater dyeing where the alum essential to its retention converts it into a pigment-like product. It is quite fast to light, but is not particularly fast to acid and chlorine. The color is not destroyed by alkali, but is, of course, dissolved.

XX—Artificial Inorganic Pigments

1270 Chrome Yellow
1288 Prussian Blue; Paper Blue S; Soluble American Blue
1272 Cadmium Yellow
1290 Ultramarine
1308 Paris Black; Carbon Black
1291 Chrome Oxide Green
1298 Chrome Green

These products are all inorganic metallic salts with the exception of Paris Black which is almost pure carbon. They are all excellent in light fastness and chlorine fastness except the Chrome Yellows and Chrome Greens which range from very good to fair in these respects.

In acid and alkali fastness, there is wider variation. Ultramarine is notoriously sensitive to acids, and the color is readily destroyed. Prussian Blue is decolorized by alkalis. Chrome Yellows and Greens are not particularly fast to either. Thus, Cadmium Yellow, Paris Black, and Chrome Oxide Green are the only members of this group with excellent all-round fastness properties.

Prussian Blue is unique in that its retention in waterleaf papers using alum is equal to its retention in sized papers using size and alum.

XXI—Synthetic Organic Pigments

Group A—Basic Color Phosphotungstates and Phosphomolybdates

. . . "Halopont," "Helmerco," "Solar," Blues, Violets, Greens, and Pinks.

Group B—Anthraquinone Vat Colors

These are generally prefaced by manufacturers' trade names such as "Ponsol," "Calcoloid," "Indanthrene," "Carbanthrene," etc.

1106 Blue RP, RS
1104 Violet RR, RRP, RRD
..... Brilliant Violet 4R
1118 Yellow G, GA, GD, EK
1096 Golden Orange G, GA, GD
1162 Red BN, BNS
1097 Golden Orange RRT, RRTD, RRTS, RRTP; Orange RRTA
1114 Blue BCS, BCF

Group C—Phthalocyanines

"Monastral" and "Heliogen" Colors
..... Fast Blue B, BWD
..... Fast Blue G, GWD
..... Fast Green G, GWD

Group D—Azo Pigments

..... "Lithosol" and "Hansa" Yellows HV, HLD, G, GAD
84 "Lithosol" and "Helio" Bordeaux BL
..... "Lithosol" Fast Orange G
..... "Lithosol" Red CSP
69 Toluidine Red or Toluidine Toner
44 Para Red

Group E—Miscellaneous

..... "Lithosol" Fast Green B; Pigment Green B

The Synthetic Organic Pigments are considerably stronger tinctorially than the pigments discussed heretofore. They are much brighter than the Natural Earth colors and compare favorably as a class with the Artificial Inorganic products in this respect. Some types, such as the Phthalocyanines and the Blue and Violet Anthraquinone Vat Colors, are exceptionally fast to light and may be considered permanent. These are also fast to other destructive influences such as acids, alkalis, and chlorine.

The Basic Color Phosphotungstates and Azo Pigments have only moderate all-round fastness properties. In comparison with the soluble colors they are fast to light but as pigments they can be considered to possess only fair fastness properties.

SULPHUR COLORS

The sulphur or sulphide dyes were first prepared in 1873 by fusing organic materials with sulphur and sodium sulphide. It was not until almost thirty years later that the range of shades was extended beyond browns to include yellows, blues, greens, bordeaux, and blacks.

This class of colors has been widely used in the dyeing of cotton. The dyes are insoluble in water but the soluble reduced form of the color is prepared by warming with sodium sulphide solution. In this reduced form, the dye readily exhausts on vegetable fibers. Oxidation, either in air or as the result of oxidizing agents, converts the dye to its insoluble form on the fiber. This procedure is analogous to the dyeing of vat colors on textiles, only the vat colors require hydrosulphite and caustic as the reducing medium instead of the sodium sulphide used with sulphur colors. In both cases, the dyed fiber, after oxidation of the dye to its insoluble form, possesses excellent wash fastness.

The paper industry has been slow to appreciate the qualities possessed by the sulphur colors. However, within the last few years, a number of mills have taken advantage of advances in the method of application; and the sulphur colors are now recognized as being among the well established classes of colors used by the paper industry.

Manufacturers' trade names of the sulphur colors include "Sulfogene," "Calcogene," "Katigen," "Sulphur," etc. The group comprises over fifty products, the most important of which (for paper) are listed below.

XXII—Sulphur Colors

1012 Bordeaux BRN, 4R; Red Brown 6RN
..... Dark Brown GNCF, NCF, Conc., R Conc., N Conc.; Brown W Conc.
..... Olive GNCF, G, GG, GCF
948 Tan 2RCF, 4RCF, R Conc.; Brown R
..... Olive Drab YCF
..... Navy Blue 4RCF; Blue 2R, 6RCF, BC8R

..... Carbon MCF; Black R, RR, 3R, RBCF; Deep Black 2RN

..... Carbon HCF; Black G, 5G, BG Extra; Deep Black NN

..... Carbon 8GCF

1006 Brill. Green 4GX, 3G Conc., 5G Conc.

The exact chemical constitution of the sulphur colors is not known. Their structure is undoubtedly highly complex and is believed to consist of thiazine units linked together by sulphur.

One of the principal objections to the use of sulphur colors in the paper industry was the evolution of hydrogen sulphide gas. This gas resulted when alum was added to the reduced sulphur color in the beater and caused neutralization of the sodium sulphide used in reducing the dye. Recent improvements in dyeing technique, involving the use of certain metal salts (see the author's U. S. Patent 2,228,465), have now completely overcome this obnoxious feature and no hydrogen sulphide is given off at any time.

The major attribute of the sulphur colors applied to paper is that they give shades absolutely fast to water bleeding. They are ideally suited to coloring fibers for granite effects or for any purpose requiring complete water fastness. Furthermore, the dyestuff is utilized entirely, and clear backwaters are obtained.

The tinctorial value of the sulphur colors is low; but the price is also low. The shades obtainable are not bright, and the most important colors are the tans, browns, and blacks, which have very good to excellent light fastness. Fastness to chlorine is poor to fair; and fastness to acids and alkalis, good.

"Facing the Forest Future"

▶▶▶ A COMPARATIVELY RECENT lecture by Dr. Wilson Compton, Secretary and Manager, National Lumber Manufacturers Association, before the School of Forestry at Duke University, contained such pertinent facts that it is believed a few highlights from the lecture would be of interest to many readers of THE PAPER INDUSTRY AND PAPER WORLD.

Here are a few of his statements:

"The trees which constitute our forest resources are living organisms whose growth and capacity of reproduction may be accelerated under careful management. Trees will die. But a forest may live forever.

"The forest landowner, who deliberately handles his property, as competent to produce continuous crops of timber, is a tree farmer. Scientifically done, tree farming, like other agriculture, assumes a knowledge comparable to that of other learned professions. More simply done, it requires no more than scientific guidance.

"Two generations in this country have listened to prophecies of approaching timber exhaustion until many have believed it their patriotic duty to use material other than wood so that the forests may be saved. They would save at the spigot rather than provide at the source.

"The extraordinary impacts of this war are vastly increasing the range of uses of forest products. Wood is challenging public recognition as vital to national welfare. Many of these emergency uses, of course, will vanish when the war ends and other materials are again available to the peaceful arts. But many others will not vanish, and forests, forestry, and forest products will rank higher in our national vocabulary after the war is over than at any time in half a century.

"In the continental United States are 630 million acres of forest land. That is almost exactly one-third of our total land area. Of this about three-fourths is so-called commercial forest land. Over one-fourth of this is in public ownership. Nearly one-third is in farm woodlands. Less than one-half is in the ownership of individuals and lumber and timber companies.

"Not quite one-half of the commercial forest land area is in saw timber. One-fifth is in merchantable cordwood. One-sixth more is in fair condition of reforestation. One-sixth, mostly in private ownership, is substantially barren of commercial regrowth. The national commercial timber supply in 1938—the most recent year for which comparable information is available—was 520 billion cubic feet. The annual removal by cutting is 11 billion; through destruction by fire, insects, and disease, 2 billion; and the estimated annual drain, therefore, 13 billion cubic feet or about one-fortieth.

"Offsetting this use and loss is a present annual growth of 11 billion cubic feet; and a prospective growth on lands now bearing old growth or virgin timber, of an additional 3½ billion cubic feet. This means a total present and prospective annual growth on the commercial forest lands a billion cubic feet greater than the present estimated average annual drain from all sources.

"If all our growth or mature commercial forest land areas are cut-over—as eventually they should be—and if these lands grow new timber at a rate no greater even than the average rate of growth on the cut-over forest lands today, the annual commercial timber growth will exceed the annual average commercial timber drain—including timber now destroyed by fire, insects, and disease—by more than a billion cubic feet, or by 8 per cent.

"With respect to privately owned commercial forest lands more than 20 per cent are under some form of scientific forest management, including 15 per cent of industrial forest areas; 30 per cent of farm woodlands. More significant is the fact that of all forest lands in private ownership—scientifically managed or not—farm woodlands and lands in industrial ownership, 83 per cent are in what the U. S. Forest Service describes as 'productive condition'; including 89 per cent of the lands in federal management; 66 per cent of the state, county, and municipal forest lands; 84 per cent of the farm woodlands; and 82 per cent of the lands owned by individuals, lumber and timber companies.

"There is and there will be no national shortage of timber supply in either softwoods or hardwoods. There are, and will be, important local and regional timber shortages which gradually ought to be rectified. To balance national timber drain with national timber growth, we must keep fires out of the woods, provide reasonable protection of forests from destruction by insects and disease, and assure simple, inexpensive encouragement to produce continuous timber crops. That will provide permanently a quantity of saw timber, cordwood, and pulpwood substantially greater than the average timber drain."

Announcing

A NEW WET STRENGTH RESIN FOR BEATER USE

Paper manufacturers long have hoped for the development of a product and process that would impart wet strength to paper and, at the same time, have the practical advantage of being effective when incorporated in the paper stock *prior* to the formation of the sheet. It is with pleasure that American Cyanamid announces the development of such a product and process.

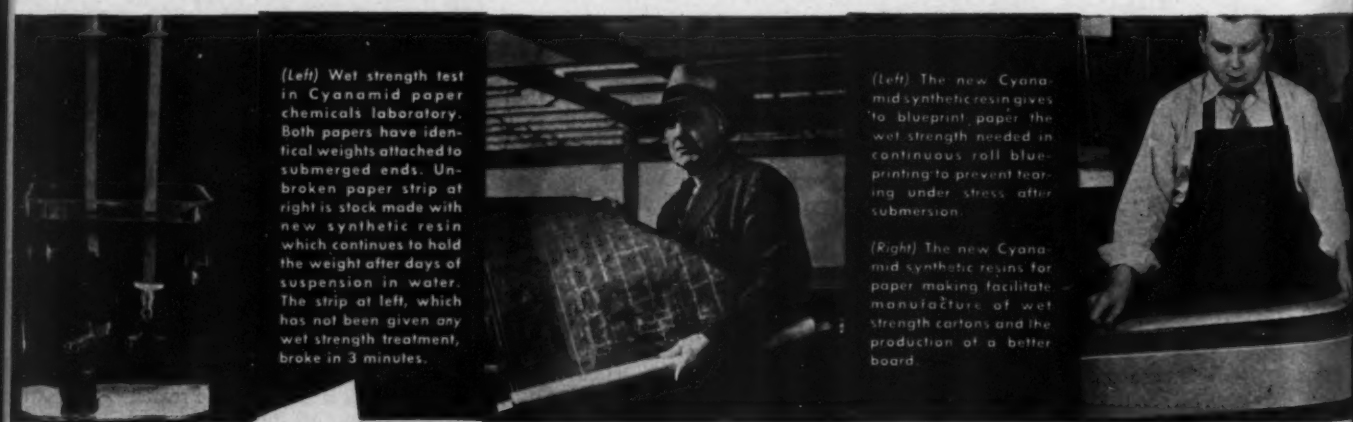
This new product needs only to be dissolved in water, and with the addition of a common and inexpensive chemical can then be added to the stock at the beater or elsewhere. The rest of the paper making operation can proceed as usual. As will be readily appreciated, this simplified method eliminates the bother of surface applications. The paper will be found to retain a substantial percentage of its dry strength even after prolonged soaking in water.

Certain valuable and unexpected properties, in addition to those for which the new synthetic resin was originally developed, are now reported by the Cyanamid technical staff. These features are included in the following summary, and apply when the resin is properly used as in the manner described above . . .

1. Folding endurance of the *dry* paper is considerably higher than without the resin treatment.
2. Bursting and tensile strengths of the *dry* paper are appreciably higher.
3. Resistance to water absorption of rosin sized papers is improved.
4. Absorbency of unsized paper is not noticeably affected.

These properties of paper are retained after prolonged storage even under adverse conditions of temperature and humidity.

If you are one of the many manufacturers who have been waiting for such a product, write us for more complete information or talk it over with your Cyanamid representative. Cyanamid technical service men are available for mill demonstrations.



(Left) Wet strength test in Cyanamid paper chemicals laboratory. Both papers have identical weights attached to submerged ends. Unbroken paper strip at right is stock made with new synthetic resin which continues to hold the weight after days of suspension in water. The strip at left, which has not been given any wet strength treatment, broke in 3 minutes.

(Left) The new Cyanamid synthetic resin gives to blueprint paper the wet strength needed in continuous roll blueprinting to prevent tearing under stress after submersion.

(Right) The new Cyanamid synthetic resins for paper making facilitate manufacture of wet strength cartons and the production of a better board.

WAX SIZES • COATING MATERIALS
ROSIN SIZES • SYNTHETIC RESINS
CASEIN • ALUM • CORN STARCH
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Reproduced at the right is the title page of the TAPPI program. These booklets were printed in two colors on antique book paper; were bound with Spiralastic, and served as programs and as souvenirs of historic Boston.

Ye AUTUMN Meeting of
TAPPI
Technical Association of the Pulp and Paper Industry
"ALL-OUT" WAR EFFORT

As convened in ye City of
Boston, Massachvsetts : :
AT Ye STATLER HOSTELRIE
throughout ye 29th and ye 30th dayes of
SEPTEMBER and of OCTOBER
ye 1st day · Anno: Dom. MCMXXXXII

Hear Ye! Hear Ye!

The New England Section of TAPPI is host to the 1942 fall meeting of the Technical Association of the Pulp and Paper Industry . . . .

The program had been arranged to demonstrate that the pulp and paper industry is playing a major part in successfully prosecuting the War, and most certainly it did this job well. So effective was the program that it is doubtful if any member or guest in attendance at the several meetings could return home without the feeling that there is in the pulp and paper industry an "All-Out" war effort and that the industry is dedicated to the task of doing its full share in maintaining the American way of life.

Registration totaled approximately 850, and every session brought out its full number of individuals interested in the specific subjects covered by the individual program.

▶▶▶ The convention opened at 10 o'clock on the morning of the first day with a Wartime Packaging Session over which Arno W. Nickerson, consulting engineer, and J. D. Malcolmson, technical director, Robert Gair Company, Inc., presided as chairmen.

R. A. Hayward, president of the Kalamazoo Vegetable Parchment Company and president of TAPPI, upon introduction by Mr. Nickerson, expressed appreciation to the sponsors of the meeting, to the advisory committee, to the active officers in charge of arrangements and to all committee members. He mentioned the presence of many guests from the consuming industry and from the Army and Navy; welcomed each and every one present; and expressed the hope that the meeting would have as its theme the complete and unqualified sharing of knowledge and experience.

New Packaging Jobs

C. W. Brown, editor of *Modern Packaging*, followed Mr. Hayward with a paper entitled *Paper Has Some New Packaging Jobs*. Here are a few highlights from his paper:

In World War I, packaging was inadequate and inefficient.

In this War, packaging is being given expert attention. Each shell has its individual carton; emergency rations are not only more edible than they were then, but they are packaged so that they remain so, whether they are sent to the tropics or the poles. Blood plasma was unheard of in the last war; now it is packaged and shipped all over the world, in many instances being dropped from airplanes. Foods for lend-lease shipments are dehydrated and packed in forms that occupy minimum shipping space, and they are protected from rough handling by modern and up-to-date packaging materials.

Meanwhile, if war supplies are to move as they should to the points where they are needed, then civilians must be content with packages which fall short of the perfection to which consumers have become accustomed.

Paper must now carry a load which is many times greater than its usual burden. . . . It must substitute for tin cans, for metal collapsible tubes, for plastic sheeting, for metal and plastic closures—it must perform miracles.

The situation presents a challenge both to the mill and the capacity of the paper technician.

Your organization is in a position —right here in this convention—to take steps that will make your combined activities stand out like a lighthouse. . . . Instead of a dozen laboratories working on identically the same

TAPPI Officials smile a welcome. (L to R)—Vincent F. Waters, technical assistant to Secretary of TAPPI; Ralph A. Hayward, president and general manager of Kalamazoo Vegetable Parchment Co. and President of TAPPI; R. G. Macdonald, secretary-treasurer of TAPPI.

problem—in secret and without the benefits of each other's findings—you can first standardize your standards, then organize your problems and divide up the work so as to speed up the solutions and multiply the results a hundred fold. Then you can pool the results for the benefit of your own industry, the industries you serve, and for the benefit of the country that means so much to all of us.

A pattern is at hand, where just that has been done. Thirty manufacturers of fiber shipping containers have organized what has been called the Weatherproof Fiber Box group for the sole and express purpose of working out improvements in the making of their product to meet the tremendously increased responsibilities required by shipping containers in the present emergency. They have discarded competitive considerations altogether and have pooled information with a view to meeting the government standards and specifications for weatherproof cases. Products approved by the group may carry a symbol which has been adopted. During the months in which we have actually been at war, this group has been making excellent progress and has been able to set and meet more rigid standards than those established by the government.

What that group has done, others can do and count their efforts well spent, for there is much at stake.

Some of the services rendered by paper packaging will unquestionably be of a temporary nature, but there will be many permanent gains—which ones would be any man's guess now. Be that as it may, a plan for technical co-operation will prepare each participant for a better kind of competitive service when peace comes; but more to the point, it may help to avert disaster now.

Packaging Trends in Wartime

The next feature on the program was an exhibition of wartime packaging conversions, prepared, exhibited, and explained by Arthur S. Allen, designer and colorist. Among the items displayed were the following: shell container; ham wrap; package for vitamin tablets; watertight bag for matches; carton designed to permit the pouring out of its contents; containers for talcum powder, tooth powder, cocoa, tobacco, and dehydrated foods; compacts; cream cheese wrap; oyster pail; labels; gum wrap; coffee bag; tube of special plastic for dental cream; packages for shortening and tobacco; and a cake package of corrugated board. The displays were developed in giant size and were exhibited individually through the help of two assistants.

Helen U. Kiely, American Writing Paper Corp., goes over the program with Joe Dow, Castle & Overton, Inc., (left), and B. W. Scribner, National Bureau of Standards (right).

▶▶▶ J. F. Halladay, technical director, American Coating Mills, presented the last paper of the morning session of the first day. His subject was *An Engineering Approach to the Solution of Packaging Problems Involving Moisture Vapor Resistance.* In this paper, Mr. Halladay briefly discussed moisture vapor testing methods; appraised their relation in perspective to the whole problem; developed a method for interpreting laboratory data from MVR membrane tests, based on mathematical handling alone; described a method for evaluating closure methods; outlined a routine procedure for determining the effect of vapor stresses produced by the contained product; and presented a way of calculating changes in the moisture content of materials enclosed in MVR packages.

Afternoon Session on Wartime Packaging

The afternoon meeting of the first day was a continuation of the Wartime Packaging Session of the morning with Arno W. Nickerson and J. D. Malcolmson continuing as chairmen. The formal papers presented before this meeting included the following:

Ration Container Problems, by Captain Robert R. Melson, U. S. Quartermaster Corps.

Folding Carton and Fiberboard Substitutes for Metal Containers, by J. D. Malcolmson, Robert Gair Company, Inc.

Conservation of Metals and Rubber, by A. F. Wendler, E. I. du Pont de Nemours & Company, Inc.

The Use of Urea-Formaldehyde Resins for the Waterproofing of Starch Used in the Production of Solid Fiber and Corrugating Board, by Philip B. Taft, The Resinous Products & Chemical Company.

Captain Melson related some of the packaging problems of the U. S. Quartermaster Corps, brought about by the world-wide movement of troops. He cited the range of temperatures to which supplies are subjected, mentioned the need for both water-proof and rat-proof containers, and called upon the paper industry for its utmost in co-operation to meet the requirements.

In the paper by Mr. Malcolmson, it was brought out that manufacturers of folding cartons are working on two developments for substitutes for tin containers: namely, a heat-sealed bag inside a carton and a wax-dipped carton. Mr. Malcolmson also related that fiberboard containers with heat-sealed inner bags are substituting for large-sized tin cans.

The paper by A. F. Wendler was augmented by a large display of various types of packages developed to conserve both metal and rubber.

Mr. Taft, in his paper, mentioned that paperboard manufacturers, particularly producers of solid fiberboard, have very recently adopted the use of a water soluble, urea-formaldehyde resin to increase water resistance of laminating gums and to obtain high resistance to ply separation when the board is soaked in water. It was stated that no difficulties are encountered in the preparation of such a waterproof glue for combining solid fiberboard. In preparing the glue, according to Mr. Taft, the dextrin is cooked and cooled to approximately 160 Fahr. or below, the resin added (within a range of 2½ to 15 per cent), and then a catalyst (preferably ammonium chloride) is included, preferably as a solution, in an amount equal to 10 to 25 per cent of the dry weight of the resin. In certain cases, for optimum waterproofing, remarked Mr. Taft, it is desirable to add some alum to lower the initial *p*H.

Mr. Taft further related that application of such a waterproof glue is made in much the same manner as normal dextrins; that borated dextrins

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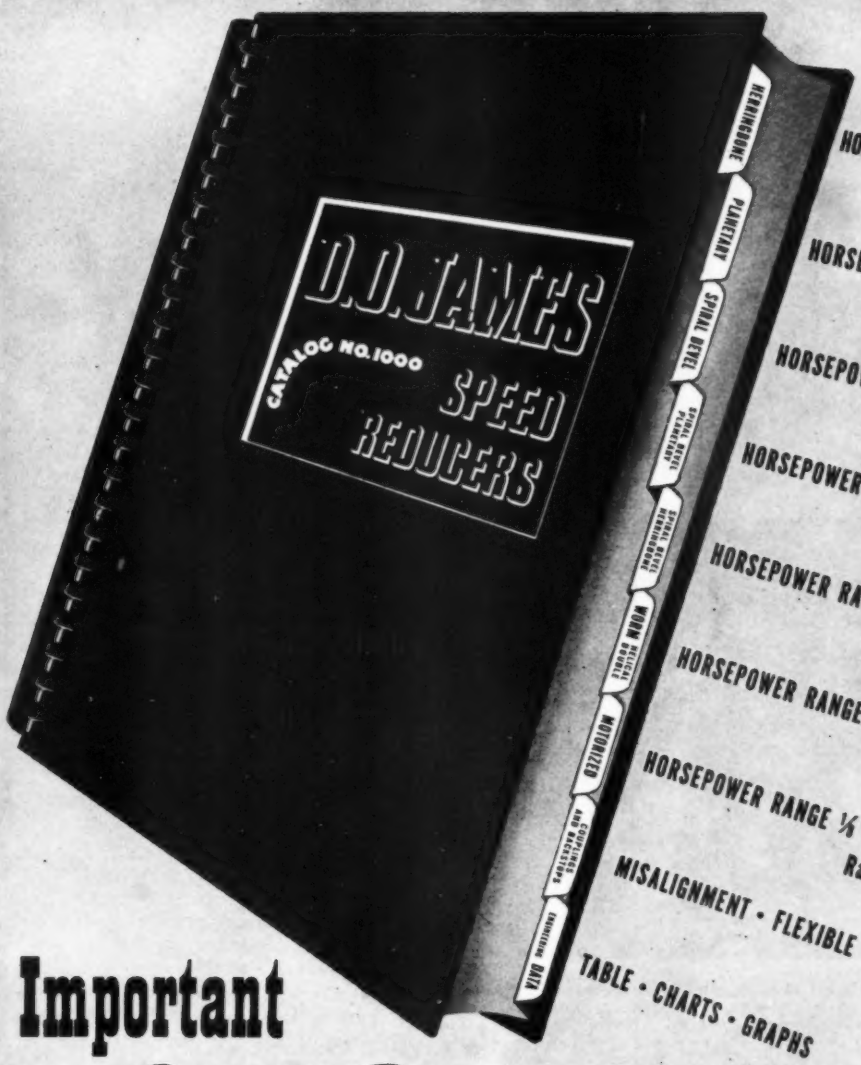

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cannot be used, since the cure of the resin requires a low *p*H; that hard-sized board must be used; and that, in most cases, a glue containing 5 per cent resin, on the weight of the dry dextrin, under proper conditions, will show almost indefinite resistance to ply separation.

WARTIME ACCENT MARKS SESSIONS OF SECOND DAY

The program of the second day included two general meetings, one in the morning, the other in the afternoon. The morning meeting was designated as a Paper Industry in War Session; the afternoon, as The Mill Organization in Wartime Session. W. H. Kenety of the Fitchburg Paper Company was chairman of the morning meeting; Mr. W. L. Cassiday of the Hummel & Downing Company, of the afternoon meeting.

A few moments relaxation and a smoke were enjoyed by (L to R): Carlo Vicario, Nash Engineering Co.; V. S. Denison, Beloit Iron Works; S. M. Bratton, Pusey & Jones Corp.; C. E. Macklem, Beloit Iron Works; William E. Greene, W. E. Greene Corp.

On the program of the Paper Industry in War Session were five papers: (1) *Opportunities and Services of the Paper Industry,* by R. A. Hayward, President of TAPPI; (2) *Wartime Paper Industry in Great Britain,* by C. Delderfield, John Dickinson & Company, Ltd.; (3) *The Future of the Paper Industry as I See It,* by T. Spencer Shore, War Production Board; (4) *The Organization and Personnel of the War Production Board,* by Arthur G. Wakeman, War Production Board; and (5) *New Papers and Paper Products for War Needs,* by John Strange, War Production Board.

The Industry's Opportunity to Serve

Mr. Hayward in his paper related that the spirit of the paper industry is to give all that it has toward winning the war. A large percentage of the products of the industry, he said, are now being used directly for military purposes. He also pointed out the need for intensive effort to solve many problems connected with the food supply for the armed forces and for essential civilian use.

The objectives of a curtailment and concentration program within the industry, according to Mr. Hayward, are as follows:

1) To release men and women from the industry whose services can be used to a better advantage in some other plant.

2) To conserve critical materials that are now being used by the industry.

3) To conserve transportation space on both railroads and trucks.

4) To conserve power and make this power available to others.

Mr. Hayward further commented that no one within the industry could raise any objection to such a program or its objectives—that everyone stands ready to co-operate in making it effective. More information about the non-essential uses of paper and the percentage involved in relation to our total production, he stated, would arouse a greater co-operative spirit within the industry in assisting with any curtailment program.

In touching upon the conservation of manpower within the industry, Mr. Hayward related that a current analysis probably would reveal that 35 per cent of the people engaged in the industry the first of this year have left either to join the armed forces or to take jobs in other industries more directly associated with our war program; that the supply of men within the industry eligible for the armed forces or capable of working on production lines is being exhausted rapidly; that the people hired during the past year are those generally not eligible for the armed services; and that, if they had been capable of accepting a war production job, they certainly would have taken that employment because the wages are substantially higher than those prevailing in the pulp and paper industry.

Citing that the pulp and paper industry produces and consumes a substantial amount of power, estimated as much as 8 per cent of the power generated within the country, Mr. Hayward pleaded for a careful analysis of the power situation before concluding that any substantial part of this power can be made available for other purposes.

Mr. Hayward, in continuing his remarks, mentioned that there is a comparatively small amount of machine equipment existing within the industry that can be used for producing other commodities; that most of the machine shops normally used for repairs are producing munitions of one kind or another; and that where this has not been done, a great many of the machine tools have been removed to other plants. He also stated that the industry has co-operated intensively in the program of reducing its requirements of critical materials, possibly by more than 50 per cent of normal requirements; and that it has reduced its transportation requirements by possibly 30 per cent, with further conservation undoubtedly to be effected in this direction.

The greatest job facing the industry, in the opinion of Mr. Hayward, is that of developing new products which can be used as substitutes for other critical materials.

Mr. Hayward further related that the entire purpose of the Technical Association is that of sharing knowledge and experience for the good of everyone; that a large group within the industry has financed and supported the Institute of Paper Chemistry which has carried on research work for the industry as a whole; and that very few restrictive patents exist within the industry.

True patriotism, concluded Mr. Hayward, not only involves giving everything we have toward winning the War but also should consider the problems and facilities that will be required to rebuild the world when the War is over. The postwar problems, he emphasized, must be a part of the thinking of every patriotic citizen so that the sacrifices being made will not have been made in vain.

▶▶▶ Mr. Delderfield stressed particularly the fibrous raw material situation of the paper industry of Great Britain which has developed as a result of the War. He called attention to the differences which British paper-

today's armed forces roll on rubber. But the chief source of supply has been cut off by the hazards of war.

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From the South—BACK ROW: (L to R)—W. M. Ebersole and H. H. Saunders, Port St. Joe Paper Co.; R. H. Stevens, National Container Corp. FRONT ROW: (L to R)—Kenneth G. Chesley, Crossett Paper Mills; Arthur Pollack, West Virginia Pulp & Paper Co.; W. F. Gillespie, Gaylord Container Corp.

makers have noted in U. S. and Canadian pulps as contrasted with Scandinavian, the former pulps being rather new to them, the latter having served as their common source of supply previous to the War. He told of straw being substituted for esparto, of wood waste being used by some mills, and of the production of lighter weight papers to obtain more yardage. The method of control of the industry during wartime likewise was touched upon as was the effort to which the Government has gone to force the people of the country to save waste paper.

▶▶▶ Mr. Shore really substituted for David P. Winton, Chief, Paper Branch, War Production Board, who found it impossible to attend the meeting. He presented an over-all picture of the war situation, stressed the activity in Washington, and pleaded for fullest possible co-operation on the part of the paper industry in the war effort.

Mr. Wakeman explained, in detail, the organization of the Paper Branch of the War Production Board, cited some of the problems incident to its formation, and told of some of its activities; while Mr. Strange discussed new papers and paper products for war needs.

Mill Organization in Wartime

The afternoon meeting of the second day included the presentation of three papers.

The first of these papers was presented by A. Catherine Davies, Hammermill Paper Company. Her subject was *Role of the Technical Librarian in the Paper Industry.* In her presentation, she described the functions of the well managed technical library and specifically mentioned many sources of technical information.

Miss Davies divided the librarian's duties into six main fields: namely, books, pamphlets, periodicals, bibliographies, abstracts, indexes, and patents. She further stated that probably the most useful, and certainly the most popular part of any technical library is its periodical collection; that bibliographies are excellent source books since it is almost as important to know where to find information as to know the information itself; and that a good technical library for the industry should contain enough patents to keep the personnel well informed on current advances in mill machinery, new processes, new kinds of and new uses for paper.

Miss Davies also pointed out that the librarian should publish and circulate a list of all material added to the library during stated intervals; that the librarian can assist greatly in planning vocational training courses; and that the librarian must cause the company personnel as a whole to realize the wisdom of the investment made by the company not only in collecting library material but also in furnishing someone trained in the details of handling it and trained in the details of paper and technology.

The second paper on the afternoon program of the second day was that of H. G. Noyes, Oxford Paper Company, on *Mill Personnel and the War Effort.* Mr. Noyes reviewed the personnel problems of the industry resulting from the war effort, discussed the essentiality of the paper industry in this effort, and told of the possibility of wider use of women in the industry.

F. H. Frost, S. D. Warren Company, was the third speaker on the afternoon program of the second day. His subject was *Technical Departments Meet War Problems.*

FOUR MEETINGS HELD ON THE LAST DAY

The third and last day of the Convention was given over to four meetings, two being conducted simultaneously in the morning, and two in the afternoon. One of the morning meetings was designated as Engineering and The War Session—the other, as The Wood Pulp Industry Wartime Projects Session. The afternoon meetings included a Water Conservation Session, and a Tub Sizing Session.

Engineering and the War

Roderick O'Donoghue, consulting engineer, was chairman of the Engineering and The War Session, the program of which included the presentation of five papers: namely, *The Flow Spreader,* by S. M. Bratton and F. M. Sanger, Pusey & Jones Corporation; *Fuel Problems in Wartime,* by E. F. Burns, International Paper Company; *Power Teamwork for Victory,* by P. W. Swain, editor of *Power; Laminated Plastics—One Answer to Shortage of Critical Metals,* by F. P. Hunsicker, Westinghouse Electric & Mfg. Company; and *Composition Bearings in Paper Mills,* by John A. Petho, Continental-Diamond Fibre Company, and Frank W. Vogt, Joseph T. Ryerson & Son, Inc.

In presenting the joint paper by Mr. Sanger and himself, Mr. Bratton explained the design features of the Flow Spreader, and discussed its application to both fourdrinier and cylinder types of paper machines.

Mr. Burns pointed out the transportation bottlenecks in relation to the coal situation, discussed the subject of coal storage, and made suggestions on getting the most out of fuels being used. In his comments on the storage of coal, he made reference to methods being employed to eliminate spontaneous combustion of bituminous coal in storage.

The paper by Mr. Swain was presented as a high-spot summary of a 32-page special section of the same title in the September, 1942, issue of *Power.* The authors of the original section were Editor Swain and Associate Editors Tucker, Annett and Rowley. Mr. Swain explained that war power must come from today's plants. He touched upon utility power pools, mentioned that the power division of WPB shortly will have records of every industrial, institutional and other special-purpose generating plant of more than 100 kw., and related technical requirements of interconnection. Mr. Swain also mentioned that power plants, both utility and industrial, must prepare to let go of men who have been considered essential . . . to hire and train others who might seem to

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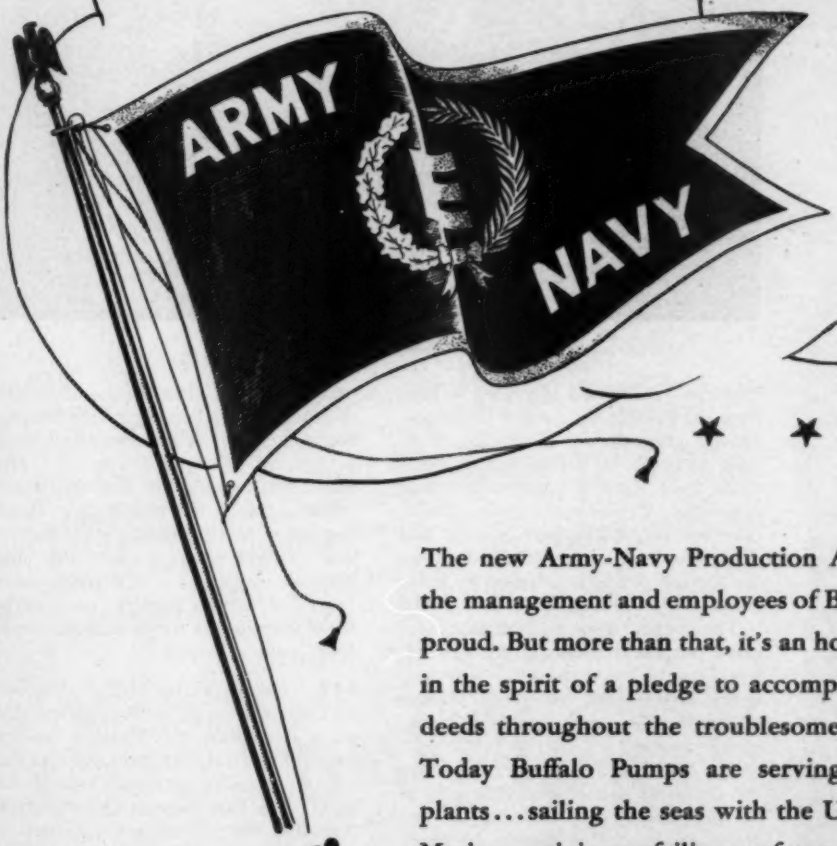

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In the paper by Mr. Hunsicker, reference was made to the severe shortages of such critical materials as bronze, Monel metal, stainless steel, copper, and rubber. The author also stressed the fact that Micarta, a laminated plastic of high strength and durability, has proved itself in many applications in pulp, paper, and paperboard mills—that it can do many other jobs for which it has not heretofore been considered.

In the joint paper by Messrs. Petho and Vogt, it was stated that composition bearings of the phenol formaldehyde condensation type were introduced to the field about ten years ago to replace metallic bearings and that now they have become definitely established in a wide variety of positions. It also related that this synthetic type of bearing is lower in thermal conductivity than any of the bearing metals, making it necessary to regulate its operating temperature with proper application of a cooling medium; that cooling of roll necks or journals is generally accomplished by heat conduction through the medium of water; and that bearing positions in pulp and paper mill applications include four groups: (1) submerged or flood water lubricated, (2) restricted or enclosed water lubricated, (3) grease and water lubricated, and (4) grease or oil lubricated.

Pulp Making in Wartime

The program of The Wood Pulp Industry Wartime Projects Session listed Henry Perry, Paul Hodges, D. T. Jackson, and D. C. Porter as chairmen, and also scheduled six papers for presentation. The titles of these papers and their respective authors are as follows: *Grinding of Hardwoods,* by E. R. Schafer and J. C. Pew, Forest Products Laboratory; *Ethyl Alcohol from Sulphite Waste Liquor,* by F. S. Hanson, Kimberly-Clark Corporation; *Pulping Studies on Selected Hybrid Poplars,* by M. W. Bray and B. H. Paul, Forest Products Laboratory; *A Study of the pH Factors in the Hypochlorite Bleaching of Wood Pulp, Part II, Two-Stage Treatment of Sulphite Pulp,* by F. Casciani and G. K. Storin, Niagara Alkali Company; *Some Observations on the Problem of Iron in Bleaching Pulp,* by E. L. Keller and F. A. Simmonds, Forest Products Laboratory; and *The Use of Cl_2 in Bleaching Rags,* by J. E. Brennan and G. P. Vincent, Mathieson Alkali Works, Inc.

▶▶▶ It was revealed in the joint paper by Messrs. Schafer and Pew that swamp tupelo, if ground soon after cutting, yields a groundwood pulp that is light colored and short fibered which can be used in appreciable quantities as filler stock in book, magazine, and newsprint paper; that groundwood pulp made from paper birch has similar properties; that groundwood pulps made from green ash and sugarberry were stronger than those made from tupelo and birch, but not as strong as standard spruce groundwood; that groundwood pulps obtained from southern cottonwood and black willow were comparable in strength with commercial groundwood but too dark in color to permit its use in newsprint or other light colored papers; and that groundwood pulp made from American elm was both short fibered and dark colored, qualities which limit its use to such products as filler stock for boards and papers of low color.

The paper also related that, for many purposes, a satisfactory groundwood can be made from the fore-mentioned woods with less energy than is ordinarily consumed in the grinding of softwoods.

Mr. Hanson, in his paper, reviewed the technical and economic aspects of the problem of manufacturing alcohol from waste sulphite liquor—mentioning that the only possible means of obtaining a large increase in ultimate yield of alcohol has been through modification of the cooking process to produce a waste liquor of high sugar content; that the process has always been somewhat marginal, even in Sweden; that war conditions have revived interest in the process in the U. S.; and that the potential alcohol production of the U. S. sulphite industry is estimated at 6 per cent of the present total alcohol production, and to be capable of furnishing 3.5-4.5 per cent of the planned production of synthetic rubber.

The paper on Pulping Studies of Selected Hybrid Poplars disclosed that the Forest Products Laboratory has determined the physical properties and the chemical composition of the wood from several elevations in the trunks of 18 hybrid poplar clones, representing 12 parentage classes; that both the physical and chemical data indicate greater variation at different elevations in a single tree than among clones either of the same or of different parentage; and that pulping experiments indicate certain advantages and certain disadvantages when compared among themselves and when compared with a sample of natural poplar. The paper also pointed out that the hybrid poplars gave lower yields of pulp of somewhat higher bleach requirements than natural poplar but that the strength properties of the pulps made from the hybrid poplars, in general, were superior to those of pulp made from natural poplar.

In line at the registration desk.

▶▶▶ The paper by Messrs. Casciani and Storin related to the continuation of a laboratory investigation on the bleaching of sulphite pulp and specifically to a two-stage treatment of the pulp. The first stage of this treatment was alike for all tests and consisted of a chlorination with 3.0 per cent of chlorine gas under constant conditions of pulp consistency, temperature, and chlorination time. The chlorinated pulp was given a standard washing treatment with water.

Using this chlorinated pulp as a raw material, a study was undertaken of the *p*H factor in the second stage, in which calcium hypochlorite solution was used as the source of available chlorine. The following conditions were held constant in this stage in all experiments: air dry consistency 6 per cent, temperature 105 Fahr., residual chlorine 0.25 per cent, and brightness after bleaching 82.

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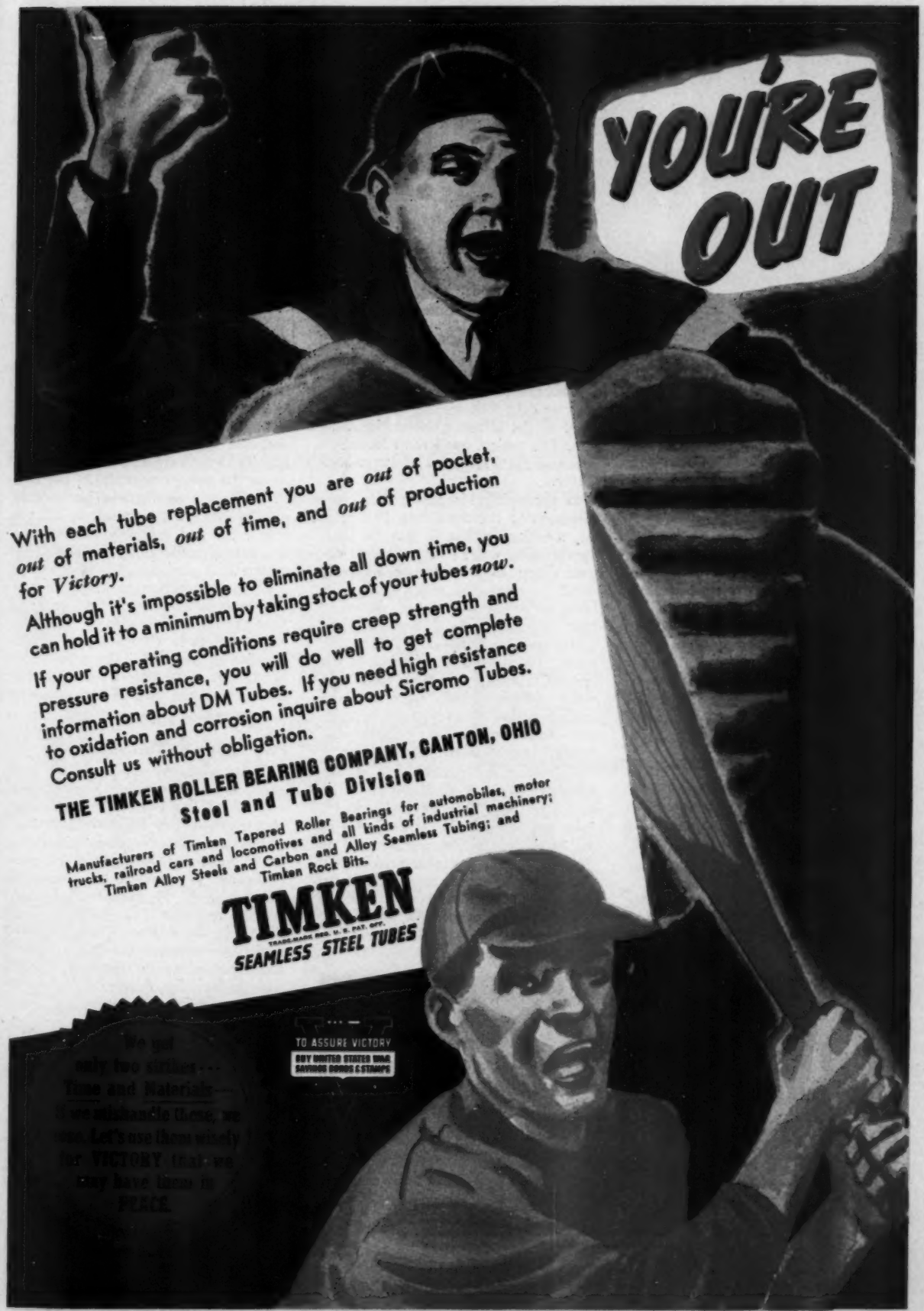

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We didn't find out whether they sing or not, but it looks as though the harmony was very good. (L to R)—T. E. Dial, Socony-Vacuum Oil Co.; R. H. Doughty, Fitchburg Paper Co.; G. H. Chidester, U. S. Forest Products Laboratory; Harry F. Lewis, Institute of Paper Chemistry.

sults were obtained when sufficient alkali was employed at the start of the bleaching reaction to yield a final *p*H of 7.5 to 8.0. The method of holding the *p*H constant at a given value throughout the bleaching treatment did not give as satisfactory results as the high initial *p*H method.

In the joint paper by Mr. Keller and Mr. Simmonds, covering observations on the problem of iron in the bleaching of pulp, the authors denoted that both the chlorination and hypochlorite stages, particularly the former, tend to remove iron from the pulp. However, the paper also brought out the fact that the pulp will reabsorb iron if water containing iron is used for washing—iron in amounts up to 0.15 ppm, according to indications, being tolerable.

Water Conservation

R. B. Martin of the Wallace & Tiernan Company presided as chairman of the Water Conservation Session. J. J. Thomas was noted on the program as chairman of the Tub Sizing Session.

The program of the first of these two meetings included the presentation of three papers; the latter, five papers.

Eskel Nordell of The Permutit Company was the first speaker on the program of the Water Conservation Session. His subject was *Recent Developments in the Treatment of Paper-mill Water.*

In presenting his paper, Mr. Nordell stressed the Spaulding Precipitator, mentioning that it may be used for softening water to any required degree down to an ultimate limit of about 17 ppm, for removal of silica from water by the use of dolomitic lime, for removal of turbidity and color, and for removal of tastes and odors. He also made reference to the Spiractor, a new type of cold lime water softener which requires a detention period of only 5 to 10 minutes and produces a granular by-product instead of the usual sludge.

Following the presentation of Mr. Nordell's paper, R. T. Sheen of W. H. & L. D. Betz Company presented a joint paper by L. B. Miller, also of the Betz organization, and himself, on *Process Water — New Developments and Conservation Measures.* This paper presented and discussed previous specifications proposed for water quality together with a table of specifications for waters for five classifications of paper products: namely, photographic and similar papers; writing and book papers; wrapping and bag papers; fine finish boxboards; coarse heavy papers and boxboards; and coarse boxboards. Mr. Sheen also stressed the need for using proper methods of water analysis for proper control of water quality.

The third paper presented before the Water Conservation Session was entitled *Diatoms in Paper Manufacture,* and was the subject of Howard W. Hall, Jr., of The Dicalite Company. This paper dealt with the use of specially processed Diatoms and their effect upon the physical properties of newsprint and kraft liner.

Two of the highlight statements from Mr. Hall's paper follow:

In the production of newsprint it has been found that between 3 per cent and 5 per cent of Diatoms present in the sheet will materially increase the opacity possibly 20 per cent . . . will increase the finish or smoothness of the sheet as much as 25 per cent . . . and probably increase the densometer readings by the same percentage.

In the production of kraft liners it has been noted that 5 per cent of Diatoms on the weight of the fiber when present in the sheet does make possible an increase in dryer efficiency of 22 per cent with a reduction in the suction box and also the suction roll vacuum.

Cornered by the cameraman, but letting him do his job—and being mighty nice about it, too. (L to R)—G. H. Spencer, Pusey & Jones Corp.; Charles R. Seaborne, Thilmany Pulp & Paper Co.; M. P. Chaplin, Chaplin Corp.; Grover Keeth, Marathon Paper Mills Co.; John A. Hanson, Badger Paper Mills, Inc.

Five Papers on Tub Sizing

There were five papers on the program of the Tub Sizing Session: (1) (1) *Tub Sizing Difficulties,* by W. G. Hendricks, Byron Weston Company; (2) *Hide Glue for Tub Sizing,* by O. B. Simonson, Milligan & Higgins Company; (3) *Enzyme Conversion of Starch,* by E. P. Gillan, Anheuser-Busch Company; (4) *Starch in Tub Sizing,* by R. B. Kerr, Corn Products Refining Company; and (5) *Synthetic Resin Emulsions for Paper Saturation and Sizing,* by Ralph T. Nazarro, American Resinous Chemicals Corporation.

Mr. Hendricks outlined a series of variable factors in tub sizing. The intent of his paper was to bring order into a discussion of groups with mutual interests.

The essential points to consider in selecting a hide glue for tub sizing, according to Mr. Simonson, are: fluidity, temperature, concentration of sizing solution, and type of paper to be sized. Mr. Simonson also gave the following specifications for sizing glue —keeping quality, appearance of dissolved glue, acidity, and odor.

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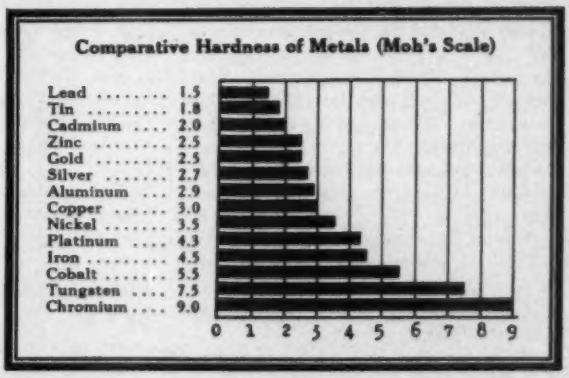

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Partial view of speaker's table at the Tuesday luncheon. (L to R)—Ralph A. Hayward, president of TAPPI; His Excellency Leverett Saltonstall, Governor of Massachusetts; Helen U. Kiely, American Writing Paper Corp., who presided at the luncheon; and Frank Cook, a humorist, as Dr. Luis Miranda of Sao Paulo, Brazil.

Mr. Gillan stated that the starch suspension should first be adjusted to a *p*H of 6.5, and the temperature raised by means of live steam introduced through a Pemberthy injector. The enzyme, he said, may be added to the suspension at any point before the temperature reaches 100 Fahr. He expressed personal preference for adding the enzyme at 100 Fahr. From that point on, Mr. Gillan stated that a definite time schedule should be followed, and the temperature raised uniformly and not too rapidly to 158-160 Fahr., or when the starch begins definitely to thicken.

Then, after holding this temperature for 15 minutes, continued Mr. Gillan, the temperature should be raised over a standard time period of not less than 15 minutes to 166-168 Fahr.

Mr. Gillan added that the batch may be held at this latter temperature for from 15 to 30 minutes, depending upon the viscosity desired (he preferring a converting time of 30 minutes and to control the viscosity by the amount of enzyme used); and that at the end of the converting period, the temperature should be raised to 200 Fahr., and held for at least five minutes before the batch is used.

If this procedure is followed, Mr. Gillan related, enzyme conversions should be perfectly satisfactory and consistently uniform.

Mr. Nazarro, in commenting upon synthetic resin emulsions for paper saturation and sizing, said that resins serve a two-fold purpose: (a) to extend the amount of rubber or latex permissible for certain work, and (b) to improve the aging characteristics and strength of treated papers. He also stated that present research involves the use of new types of resins prepared by control polymerization of oils to yield tough, rubbery solids; that the utilization of modified vinyl and acrylic polymers reduces cost and increases availability of these particular resins; that successful low-cost sheets are being produced commercially by the use of reclaim dispersions extended 50 per cent or more with suitable resins; and that all resin-saturated sheets and flexible fiber boards completely free of rubber in any form are in commercial manufacture.

Institute Papers Presented by Title

Six papers from the staff of the Institute of Paper Chemistry were presented by title. These papers with their respective authors were as follows:

The Measurement and Influence of Bonding between Paper Fibers, by James d'A. Clark.

Factors Influencing Apparent Density and Its Effect on Paper Properties, by James d'A. Clark.

The Variable Angle Surface Illuminator, by John H. Graff.

Chart for Speck Analysis by B. L. Browning and John H. Graff.

Fluorescence of the Extractives of Wood, by William W. Marteny.

A Fundamental Study of the Nature of Fiber Staining by Iodine Stains, by Herbert W. Rowe.

LUNCHEON AND BANQUET —OTHER ENTERTAINMENT

Several other features of this "Ye Autumn Meeting of TAPPI" must not be overlooked. They included the splendid exhibit of paper products —the first time that TAPPI has exhibited products of the industry, and an interesting program for the women.

There was a luncheon on the first day of the Convention, a Boston Tea Party on each of the two succeeding evenings, and a banquet on the last evening as a grand finale.

Miss Helen U. Kiely, of American Writing Paper Corporation, presided at the luncheon; Mr. Norman I. Bearse of Champion International Company was toastmaster at the banquet.

His Excellency, Leverett Saltonstall, Governor of the Commonwealth of Massachusetts, spoke briefly at the luncheon. His remarks related particularly to the war situation and to the part that the paper industry is taking in it.

On the same program with the Governor was Frank Cook, a humorist, in the character of Dr. Luis Miranda, general manager, O Papel, Sao Paulo, Brazil. So clever was his impersonation that few, if any, other than those previously informed, had any idea that he was playing a part. Sell "America the Beautiful" to ourselves and to our friends was the theme of his fervently patriotic message.

Banquet guests were entertained by Neal O'Hara, newspaper columnist. His remarks were witty and humorous.

If the spirit of the meeting, from the beginning to the end, could be epitomized into only a few words, probably no words would be more suitable than—

"My country, 'tis of thee,
Sweet land of liberty,
Of thee I sing:
Land where my fathers died,
Land of the pilgrims' pride,
From every mountain-side
Let freedom ring."

◆

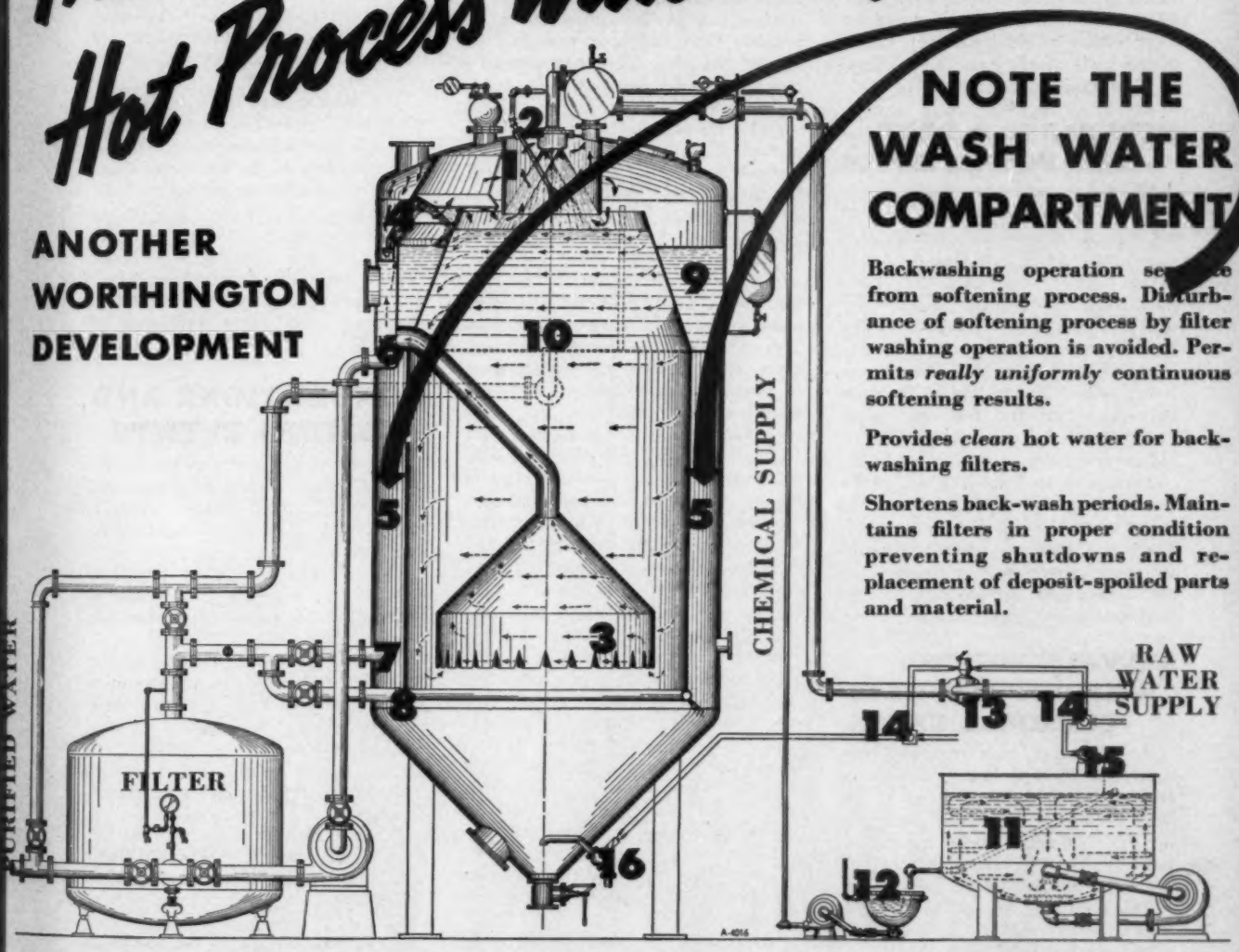
F. G. ROBINSON TO PRESENT AWARD IN TECH. SECTION

Past president of the Canadian Pulp and Paper Association, F. G. Robinson will present a bronze award for the use of the Technical Section. Named "The Technical Section Service Award," it is to be presented annually, for the next three years beginning 1942, to the committee chairman, preferably, or committee member who, in the opinion of the Technical Council, has contributed most toward the furthering of the aims and objectives of the Technical Section and its successful activity.

Also through the generosity of Mr. Robinson, and in recognition of the work done by Ellwood Wilson on behalf of forest management in the industry, the "Ellwood Wilson Award," consisting of a handsome bronze plaque, will be awarded in 1942,

The only uniformly continuous Hot Process Water Softener!

ANOTHER WORTHINGTON DEVELOPMENT



STEAM ——→ WATER - - - →

NOTE THE WASH WATER COMPARTMENT

Backwashing operation separate from softening process. Disturbance of softening process by filter washing operation is avoided. Permits *really uniformly* continuous softening results.

Provides *clean* hot water for backwashing filters.

Shortens back-wash periods. Maintains filters in proper condition preventing shutdowns and replacement of deposit-spoiled parts and material.

And check these numerous other features

1. Primary Heater. Non-scaling. Efficiently heats the raw water and provides rotary mixing of water and chemicals.
2. Chemical Applicator. Removable. Sprays chemical through steam. Facilitates mixing and reaction.
3. Up-take Cone. Baffled serrations assure even draught. Increases softener capacity 50% over common practice.
4. Deaerating Heater. Simple. Effective. Self adjusting. No moving parts.
5. Wash Water Compartment. (See above).
6. Supply to Filter Wash Pump Suction.
7. Discharge of Dirt Laden Wash Water. Reclaimed by settling clear within 1½ hours.
8. Cleansing Ring. Provides uniform distribution of jets for washing softener precipitate and wash water sediment to central area of conical bottom.
9. Storage for Treated and Deaerated Water.
10. Treated and Deaerated Water Outlet to filters or direct to boiler feed pumps.
11. Chemical Agitator. Maintains chemical mixture of uniform strength. No submerged bearings or paddles. No objectionable surface wave action to interfere with decantation.
12. Chemical Dilution and Pump Suction Tank.
13. Proportioning Meter. Accurate. Low loss. Equipped with totalizing register.
14. Relays. Adjustable time interval.
15. Decanting Mechanism. Sturdy. Reliable. Accurate.
16. Sludge Remover. Removes sludge in proportion to its rate of formation.

For full details Bulletin W-212-B2 is available at district offices (in all principal cities) or at headquarters.

WORTHINGTON

WORTHINGTON PUMP & MACHINERY CORPORATION • GENERAL OFFICES: HARRISON, N. J.

1943, and 1944 to the member of the Woodlands Section of the Association who, in the judgment of the executive council of the Woodlands Section, has, during the year, accomplished the most effective industrial application of research projects initiated by the council and carried out in collaboration with the Pulp and Paper Research Institute of Canada. For 1942, the award will be given for the most effective industrial application of the study of efficiency of technique of pulpwood cutting in 1941.

◆

NEW PLACE & DATE FOR POWER SHOW

Word has just been received that the 15th Exposition of Power and Mechanical Engineering, which was scheduled to be held in Grand Central Palace, New York City, has been transferred to Madison Square Garden, and will be held from November 30 to December 4 instead of December 5 as originally planned. This change is due to the fact that the U. S. Army has taken over the four exposition floors of the Palace to be used as an induction center.

This year, in line with industry's concentration on the war effort, the aspect of the Power Show is changed. There is a need for more power and for using power more efficiently than ever before—but on production problems that are relatively new.

◆

SALVAGE SECTION WILL BE FEATURE OF CHEMICAL EXPOS.

Arrangements have recently been concluded by the Industrial Salvage Section, Conservation Division of the War Production Board to participate in the National Chemical Exposition to be held November 24 to 29 at the Sherman Hotel in Chicago.

The Industrial Salvage Section will have adequate space for an educational exhibit and will stress the campaign to salvage approximately 100,000 pounds of essential chemicals. In explaining the program of the Industrial Salvage Section, S. Donald Perlman, executive chemical director stated that it "provides for the reclamation of millions of gallons of war-essential chemical solvents, paints of all kinds, oils and chemical by-products and we have appealed to the sponsors of the show to co-operate." He said that conferences with business firms engaged in the reclamation and recovery of commercial solvents indicate that it will be possible to increase from 50 to 75 per cent the amount of solvent reclamation currently accomplished.

CONCENTRATION DISCUSSED BY E. W. TINKER

In a talk before the Salesmen's Association of the Paper Industry, E. W. Tinker, executive secretary of the American Paper and Pulp Association, took occasion to give an entirely different picture of the paper industry's attitude toward the concentration of industry than had been presented in one of the New York newspapers a couple of weeks previous. The newspaper article had stated that a horizontal reduction in paper production was meeting strenuous opposition from the mill executives. Mr. Tinker stated that instead of opposing the Government's proposals for means to advance the war effort, the paper industry was in fact co-operating closely to work with government officials to produce the best possible results and to render a full measure of service to the nation. The industry, he stated, was devoting every effort toward the conservation of essential transportation, employing women and older men to replace workers where man power is an important factor, and doing everything possible to conserve critical materials. He said that in his opinion the paper industry has the best prospects of any major industry for emerging from the War.

Meanwhile, the question of concentration of industry is very much to the fore in the minds of paper mills and the War Production Board. Various rumors have been prevalent, principally the report that a horizontal cut in production would be ordered, various hints being from 25 to 35 per cent. It is known that the WPB is giving this problem deep consideration and the paper industry's chief objection to the attitude of the Board is the belief in some governmental quarters that paper is not an essential commodity. This theory, paper manufacturers believe, is entirely contrary to the facts.

As part of the general problem a recent statement by E. W. Palmer, deputy chief of the Printing and Publishing Branch of the WPB, has stirred up no little comment. He asked the printing and publishing industry to plan and carry out immediately the utmost curtailment of consumption by weeding out the luxury and specialty products. He urged the curtailment of multi-color printing and that unless this was done there might be a WPB order limiting all printing to a single color in order to conserve the use of copper and zinc for printing plates. Paper men countered with the claim that already there has been a great reduction in paper consumption by the decrease in advertising.

MICHIGAN SUPTS. ELECT NEW OFFICERS

At the annual dinner meeting of the Michigan Division of the Superintendents Association at the Park-American Hotel in Kalamazoo on September 17, Alfred B. Perlick was elevated from first vice chairman to chairman, succeeding Henry Nendorf of Rex Paper Company, Kalamazoo. Mr. Perlick is superintendent of bleaching at the Kalamazoo Vegetable Parchment Company.

The other officers are: Glen Sutton, Sutherland Paper Company, Kalamazoo, first vice chairman; Ralph Atkins, superintendent of the Lee Paper Company, Vicksburg, second vice chairman; Joseph L. Waber, Rex Paper Company, secretary-treasurer. The speaker at the meeting was Frank Brown, purchasing agent of the Michigan Paper Company, Plainwell, who discussed "Purchasing Problems of Today."

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CONVENTIONS AND COMING EVENTS

Oct. 17—Fall meeting of the Northwest Division American Pulp and Paper Mill Superintendents Association, Hotel Wausau, Wausau, Wisconsin.

Oct. 27-29—The Thirty-first National Safety Congress and Exposition at the Sherman, LaSalle, and Morrison Hotels, Chicago.

Nov. 12-14—Joint meeting of the Southern and Southeastern Divisions of the American Pulp and Paper Mill Superintendents Association, Atlanta-Biltmore Hotel, Atlanta, Georgia.

Nov. 24-29 — National Chemical Exposition, at the Sherman Hotel, Chicago.

Nov. 30-Dec. 4—15th National Exposition of Power & Mechanical Engineering, Madison Square Garden, New York City.

STATED MEETINGS

Technical Association of the Pulp and Paper Industry.

Delaware Valley Section—First Friday of each month—Engineers' Club, Philadelphia.

Kalamazoo Valley Section — First Thursday of each month—Park American Hotel, Kalamazoo, Mich.

Lake States Section—Second Tuesday of each month—Conway Hotel, Appleton, Wis.

New England Section—Third Friday of each month—Roger Smith Hotel, Holyoke, Mass.

The American Pulp and Paper Mill Superintendents Association, Inc.

Michigan Division — Third Thursday of each month—Park American Hotel, Kalamazoo, Mich.

May the wreath we have won never wither

THE War Department and the Navy Department of the United States have conferred upon the men and women of Chain Belt Company the highest honor that can be paid to civilians engaged in war work . . . the Army-Navy "E" for outstanding achievement in production.

Because of our knowledge of the intense determination for Victory which has inspired Chain Belt workers in their willingness to serve and sacrifice, we were not surprised that the award was made. We knew it had been earned and we are gratified that this just recognition has been given.

The Army-Navy "E" pennant will fly proudly from the Chain Belt flagstaffs; and from the lapel of every worker will gleam the shining badge of honor which the Government has cast to signify individual and collective effort beyond the normal conception of duty.

Chain Belt will endeavor to maintain the pace which it has established—to produce more and more for the triumph of our arms.

May the wreath we have won never wither!

THE LAUREL *of this wreath is a symbol of the Victory which Chain Belt workers are determined to win.*

THE OAK *of the wreath symbolizes the strength of the nation—on the battle lines and on the production front.*

CHAIN BELT CO.
OF MILWAUKEE

PAPER SKETCHES

CIGARETTES MADE OF MARYLAND TOBACCO AND SPANISH CIGARETTE PAPER WERE SMOKED IN AMERICA AS EARLY AS THE 1830'S!
THE ART OF POLISHING PAPYRUS WITH IVORY IS SAID TO HAVE ORIGINATED WITH THE ANCIENT ROMANS.
WILLIAM STANIAR
STRETCHERS MADE OF SEVERAL THICKNESSES OF HEAVY PAPER WATERPROOFED ON THE BOTTOM AND LOOPED AT THE SIDES FOR INSERTING OR REMOVING OF HANDLES OR POLES HAVE BEEN MADE RECENTLY BY A PACIFIC COAST PAPER BAG CONCERN.
THE FIRST AMERICAN FOURDRINIER WIRE WAS WOVEN IN SEPTEMBER, 1827 IN BELLEVILLE N.J. BY WILLIAM STANIAR AND CORNELIUS VAN HOUTEN.

Invest the Savings in ★ ★ ★

WAR BONDS

★ ★ ★ From the thinnest tissue to the heaviest board, there is a HAMILTON FELT that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills •

Hamilton Felts

• Established 1858 •

ALLIED

ARMY-NAVY "E" AWARDS

American Machine and Metals, Inc., East Moline, Illinois—For high achievement in the production of war materials, the East Moline plant of this company received the Army-Navy "E" pennant. Presentation ceremonies were held at the plant on October 1.

Bausch & Lomb Optical Company, Rochester, New York—On September 6, 1942, this company was awarded the Army-Navy "E" flag for excellence in production. This company has been honored before for outstanding achievement. On July 25, 1941, the original Navy "E" was awarded to Bausch & Lomb, one of the first fourteen companies to receive it (cf. THE PAPER INDUSTRY AND PAPER WORLD, February, 1942, p. 1008) then, on May 18, 1942, the All-Navy "E" burgee—the first award with the added star, signifying continued compliance with requirements for over six months, was won (cf. THE PAPER INDUSTRY AND PAPER WORLD, June, 1942, p. 288).

Buffalo Pumps, Inc., Buffalo, New York—The new joint Army-Navy Production Award was presented to the management and employees of this company in an imposing ceremony at North Tonawanda. The presentation was made by Rear Admiral Wat T. Cluverius, U.S.N. (retired), and was accepted by Edgar F. Wendt, president of Buffalo Pumps. One of the highlights of the occasion was when Edward C. Lyons, oldest employee of the firm, received the Army-Navy "E" pins in behalf of the hundreds of employees present from Commander Robert S. Smith, Jr., of the Navy and Lieutenant Colonel Charles F. Mosher of the Army.

Chain Belt Company, Milwaukee, Wisconsin—Amid a colorful setting of many flags and in the presence of over 4,000 employees and their families, Lieutenant Colonel D. J. Martin, chief of the Cannon and Aircraft Armament Section, Artillery Division, Office of the Chief of Ordnance, War Department, presented the Army-Navy "E" burgee to J. T. Brown, vice president, on September 19. J. C. Merwin, president of Chain Belt, made the welcoming address in which he read a letter from Winston Churchill written after World War I expressing the appreciation of the British government for the co-operation the Chain Belt Company gave them toward winning that war. Brigadier General A. G. Gillespie, commandant of the Watervliet Arsenal, New York, also spoke briefly, and Captain D. D. Dupre, commandant of the Naval ROTC at Marquette University, presented Army-Navy lapel insignias to a number of employees. Daniel W. Mackie, veteran employee, accepted for the employees. Honorable Julius P. Heil, governor of Wisconsin, made the closing remarks.

Duriron Company, Inc., Dayton, Ohio—September 12 was an outstanding day for the employees and management of this company, for on that day the Army-Navy "E" was conferred in recognition of exceptional achievement in the production of war materials.

Kropp Forge Company, Chicago—Word has recently been received by Roy A. Kropp, president, from Admiral H. A. Wiley of Washington, that this company has been awarded the Army-Navy "E" for production achievement. A white star in the Navy section of this burgee testifies to a previous award of the Navy's Bureau of Ordnance. Too busy to stop turning out forgings for the Army and Navy to stop for formal ceremonies; nevertheless, each employee will receive a special "E" button symbolizing his part in securing the company honor, according to Mr. Kropp.

Towmotor Company, Cleveland, Ohio—At the company plant in Cleveland, on September 14, Colonel William H. Clopton, Army veteran of the Spanish-American and World Wars, presented the Army-Navy "E" flag to Lester M. Sears, president. With the statement, "It's yours. Fly it over the production line, if that's where you want it. I'll be even prouder to see it there than over my office," Mr. Sears turned it over to Elmer Redding, employees' representative. Also taking part in the ceremony were the Honorable Frank J. Lausche, mayor of Cleveland; Captain Ross P. Schlabach, inspector of Naval materials, Cleveland district; Captain Spencer H. Pratt, U. S. Marine Corps and formerly a Towmotor employee; and C. E. Smith, Sales manager, acting as master of ceremonies.

Westinghouse Electric and Manufacturing Company, East Pittsburgh—Five Pittsburgh-area plants of this company were recently awarded the Army-Navy "E" pennant. The plants so honored were the Transformer Division at Sharon, the East Pittsburgh Division, which includes the porcelain plant at Derry, Nuttall Gearing Works in Pittsburgh's Lawrenceville section, and plants at East Pittsburgh and Trafford. Rear Admiral William Carleton Watts of the Navy made the presentations at the various plants. Official hosts were W. F. Bailey, manager at the Derry works, and G. S. Ryan, manager of the Feeder Division, in behalf of the Trafford works and its employees. A. C. Streamer, vice president, accepted the pennant at the East Pittsburgh plant. L. R. Botsai, manager of the Gearing Department, was the official host at the Nuttall plant. H. V. Putman, manager of the Transformer Division, expressed appreciation on behalf of the Sharon plant and workers. A. W. Robertson, chairman of the board, and George H. Bucher, president of Westinghouse, as well as other executives of the company, attended the various award ceremonies.

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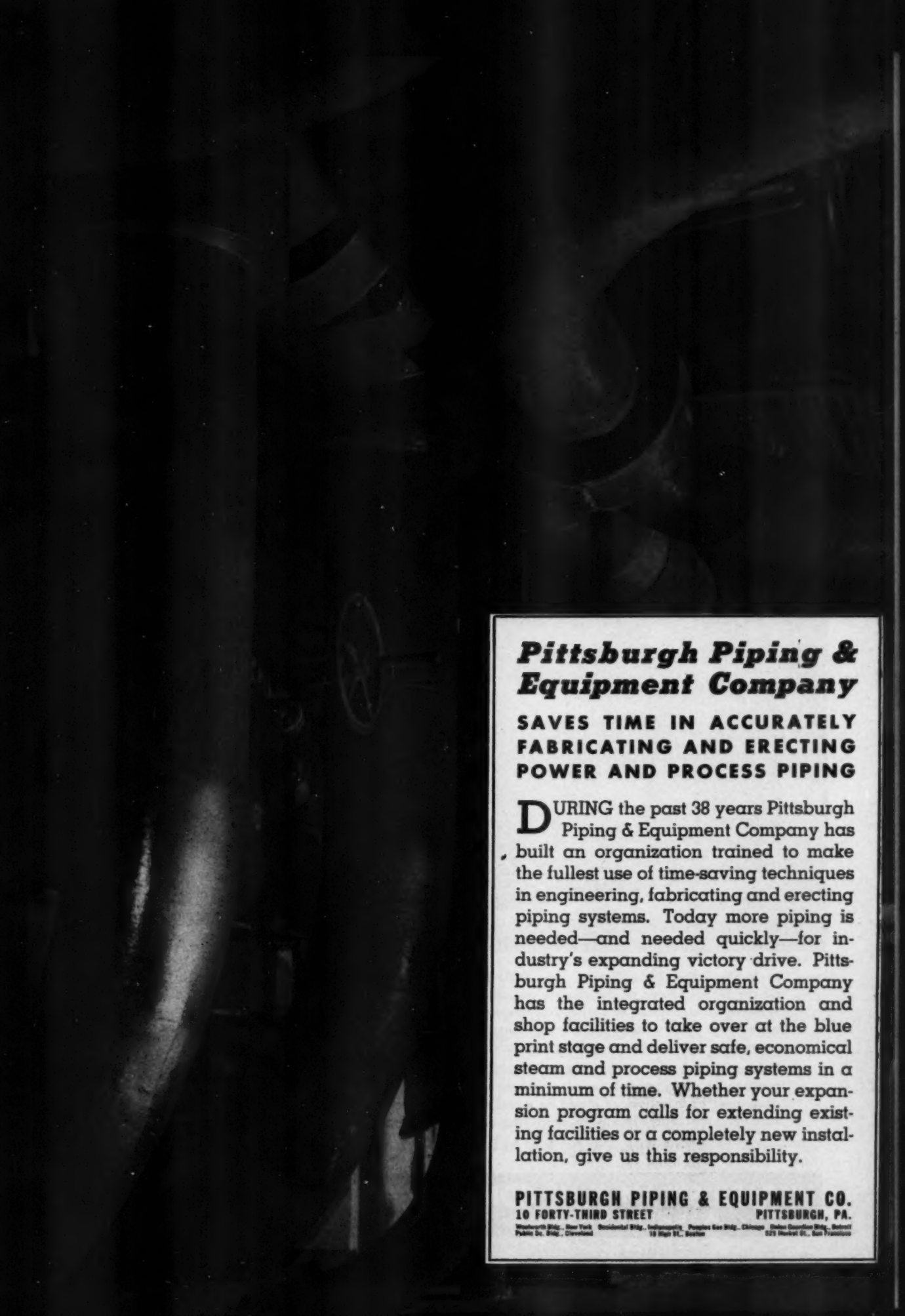
▸▸ THE EFFECTIVENESS OF offset color lithography has been strikingly demonstrated in the production of the 1942 Annual Report of Harris-Seybold-Potter Company of Cleveland, Ohio. The Nation's wartime posters were chosen as the decorative motif of the report and were reprinted in color. An explanatory type of report, it meets a very definite wartime need, as it contributes to the war effort by providing a frank discussion of American business enterprise at war.

◆

CEREMONIES MARK EASTWOOD-NEALLEY ARMY RELIEF GIFTS

Checks totalling $2,500 were presented to representatives of the Navy Relief Society and the Army Emergency Relief Society by the employees of the Eastwood-Nealley Corporation of Belleville, New Jersey. Each society received $1,250.

An American flag used in 1896,



Pittsburgh Piping & Equipment Company

SAVES TIME IN ACCURATELY FABRICATING AND ERECTING POWER AND PROCESS PIPING

DURING the past 38 years Pittsburgh Piping & Equipment Company has built an organization trained to make the fullest use of time-saving techniques in engineering, fabricating and erecting piping systems. Today more piping is needed—and needed quickly—for industry's expanding victory drive. Pittsburgh Piping & Equipment Company has the integrated organization and shop facilities to take over at the blue print stage and deliver safe, economical steam and process piping systems in a minimum of time. Whether your expansion program calls for extending existing facilities or a completely new installation, give us this responsibility.

PITTSBURGH PIPING & EQUIPMENT CO.
10 FORTY-THIRD STREET PITTSBURGH, PA.

Woolworth Bldg., New York Residential Bldg., Indianapolis Peoples Gas Bldg., Chicago Union Guardian Bldg., Detroit
Public Sq. Bldg., Cleveland 10 High St., Boston 525 Market St., San Francisco

bearing only 45 stars, served as a very fitting background for the ceremony. Edward Powers and William Peck represented the employees, and Lieutenant Commander John H. Auerbach accepted the check for the Navy Relief Society and Captain F. V. Smith for the Army Emergency Relief. Harry G. Specht, vice president and general manager of the corporation, introduced the program and outlined the struggle for freedom of other nations as well as the United States. Present with Captain Smith of the Army Relief was Captain W. E. Southard.

LUBRICATION OF PULP AND PAPER MILL MACHINERY

The Sales Technical Service Department of the Standard Oil Company (Indiana), Chicago, has just released a new edition of its "Engineering Bulletin" (P-82) on the subject of *Pulp and Paper Mill Machinery and Its Lubrication.* This compilation is a comprehensive treatment of the subject of paper mill lubrication, and with the present-day need for protection and maintenance of equipment, such a publication becomes a real service.

The material in this bulletin is well organized and outlines the principles of lubrication for all the main types of equipment in the mill. An accordion fold suggestive of Cost Record Forms is tipped to the back cover. This form illustrates both Lubricants Consumption Chart and Lubricants Cost Chart which may be arranged to meet individual mill applications.

◆

MAINTENANCE CHART

The Downingtown Manufacturing Company has prepared a large wall chart artistically done in color. The chart is divided into four sections, each giving maintenance hints for the following: Downingtown extractors; Downingtown suction extractors; Downingtown suction felt rolls; any rubber covered suction press. The maintenance of equipment is so important these days and instructions such as given by this manufacturer should be followed carefully to maintain necessary equipment and get the best possible service from it.

Copies of this chart may be secured by writing to the Downingtown Manufacturing Company, Downingtown, Pennsylvania.

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▸▸▸ THE FIRST PERCY NICHOLLS AWARD "for notable scientific or industrial achievement in the field of solid fuels" was presented to E. G. Bailey, vice president of The Babcock & Wilcox Company, New York City, at the banquet of the joint Fuels Conference of the Coal Division, A. I. M. E., and Fuels Division, A. S. M. E., St. Louis, Missouri, September 30. Eugene McAuliffe, president of the A. I. M. E. made the presentation.

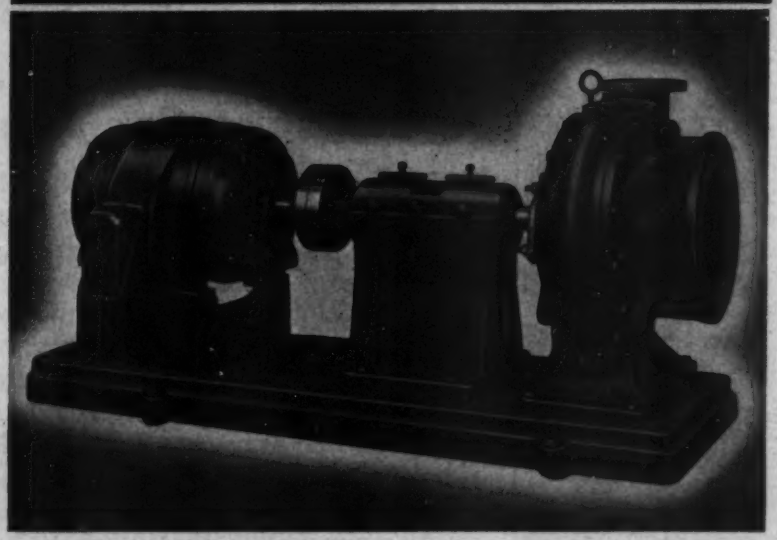
◆

STANDARDIZATION ANNOUNCED BY THE AMER. ENG'R'G CO.

A standardization program on sixteen sizes of Hele-Shaw fluid power pumps of the American Engineering Company, Philadelphia, has recently been announced. Standardization affects pumps in both the low pressure and high pressure ranges.

This step will enable the company to increase production and improve deliveries in the face of procurement difficulties. Also, replacements of completed units and replacement parts will be made available promptly. Materials can be ordered in advance with the assurance they will be used, and replacement parts produced and stocked against predictable future requirements.

NOT *SIX* MINUTES ... BUT *THREE*



is the time taken by a Warren Type SOD Pump in which to fill the Beater in one of the efficient rag mills that have made Western Massachusetts so well and favorably known in the fine paper field. This particular pump was bought to do the job in *six* minutes but the reserve capacity cut the time exactly in half.

Sooner or later you will be confronted with conditions or circumstances where added capacity without additional cost in equipment or maintenance would be a real asset. Prepare for such an eventuality by always specifying and insisting upon

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC.
WARREN, MASSACHUSETTS

How to Get Better Process Water

STRATHMORE GUARDS FINE PAPERS AGAINST SPOTS AND SPECKS WITH NORWOOD FILTERS

Part of the many Norwood Filter beds that help guard Strathmore fine papers against spots and specks.

Send For Engineering Data Units

We have helpful Engineering Data Units covering Norwood Equipment. Send for your set today.

Filters: Ask for Portfolio F for a complete set of data units on Norwood Water Filters.

Calenders: Ask for Portfolio C for a complete set of data units on Norwood Calenders.

ONE of the many reasons for the high quality of Strathmore papers is that the folks at Strathmore guard against spots and specks by processing their water with efficient Norwood Filters. They have been using Norwood Filters since 1913 and find them dependable, easy to operate, and exceptionally low in maintenance costs. You, too, can gain all of these advantages by using Norwood Filters. Investigate now.

Get a Good Start And a Good Finish With

NORWOOD

WATER FILTERS AND PAPER FINISHING MACHINERY

The Norwood Engineering Company
16 No. Maple St., Florence, Mass.

S A F E T Y

SAFETY CONTEST SCORES

The scores shown on this page are for the second month of the Paper Industry Annual Safety Contest which began July 1, 1942. Fifteen new companies enrolled in the 1942-43 Contest; eighty-one plants started the new contest with perfect records.

Final scores for the contest which closed June 30, 1942, have been tabulated and the winners of each group will receive the group award at the Paper and Pulp Section luncheon on October 29, the closing day of the Annual Safety Congress in Chicago. Trophy winners in each group are:

DIVISION I

Group A—Price Brothers & Co., Ltd., Riverbend, P. Q.

Group B—Quebec North Shore Paper Co., Baie Comeau, P. Q.

Group C—American Writing Paper Corp., Parsons Div., Holyoke, Mass.; The Mead Corp., Harriman Div., Harriman, Tenn.; Marathon Paper Mills Co., Ashland Div., Ashland, Wis.

Group D—U. S. Gypsum Co., No. Kansas City, Mo.; Spaulding Fibre Co., Inc., Milton, N. H.; Spaulding Fibre Co., Inc., Hayes, N. H.

DIVISION II

Thilmany Pulp & Paper Co., Bag Mill, Kaukauna, Wis.

Bird & Son, Inc., Roofing Plant, Shreveport, La.

Bay West Paper Co., Green Bay, Wis.

The major trophy in the Paper Industry Contest will also be presented at the Paper and Pulp luncheon. The winner of this award, the Edward Benton Fritz Memorial Trophy, is chosen by a board of judges from the above trophy winners—the mill which has made the most outstanding record for the term of the contest.

◆

FIGHTING FIRES IN CONFINED SPACES

Fire Prevention Week, which was observed October 4 to 10, brought out important suggestions for improving fire defenses and teaching fire-fighting forces new methods.

The Safety Research Institute, New York City, gave wide publicity to a problem often overlooked by many businesses and industries—that of fighting fires in confined spaces, such as basements, cellars, pits, manholes, vaults, and small compartments generally. The important feature of this problem is that it involves life-hazards that exist to a far less degree with fires in places where there is ample ventilation. These hazards originate in the fire itself, and go beyond the heat and flame. Every fire, especially when burning where the ventilation is poor, generates large volumes of the deadly carbon monoxide, and, frequently, other gases, even more poisonous, such as hydrogen sulphide and hydrogen cyanide. In consequence, it is always dangerous to breathe smoke and fire gases, and especial care must be taken to avoid this danger when the fire is in a confined space.

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▶▶▶ TWO HUNDRED THOUSAND SOLDIERS, sailors or marines could have been supplied with war equipment produced in the time lost through accidents in 1941, according to the 1942 edition of *Accident Facts*, the National Safety Council's statistical yearbook. But this equipment wasn't produced—"the saddest are these, it might have been." Men who could have turned out this equipment were put out of commission by accidents just as effectively as though they had been shot down by the enemy.

The Paper Industry Safety Scores

July 1, 1942 to June 30, 1943

Out of 191 mills reporting for August, 57 have perfect record

PERFECT SCORES

Division I—Pulp and Paper Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
Kimberly-Clark Corp.	Kimberly	Wisconsin
Marathon Paper Mills Co.	Menasha	Wisconsin
The Flintkote Co.	Pioneer Div.	Los Angeles, Cal.
Price Brothers & Co., Ltd.	Riverbend	Quebec, Canada
*Mersey Paper Co., Ltd.	Liverpool	Nova Scotia, Canada
The Flintkote Co.	New Orleans	Louisiana
GROUP B		
Consolidated Paper Corp., Ltd.	Port Alfred	Quebec, Canada
The Champion Paper & Fibre Co.	Houston Div.	Pasadena, Texas
Rayonier, Inc.	Port Angeles Div.	Port Angeles, Wash.
Kimberly-Clark Corp.	Niagara	Wisconsin
*Wood Conversion Co.	Cloquet	Minnesota
Hoberg Paper Mills, Inc.	Div. "A"	Green Bay, Wis.
U. S. Gypsum Co.	Greenville	Mississippi
West Virginia Pulp & Paper Co.	Williamsburg	Pennsylvania
Combined Locks Paper Co.	Combined Locks	Wisconsin
The Flintkote Co.	Meridian	Mississippi
GROUP C		
International Paper Co.	North Tonawanda	New York
Container Corp. of America	Coated Board Div.	Chicago, Ill.
*Escanaba Paper Co.	Escanaba	Michigan
Strathmore Paper Co.	West Springfield	Massachusetts
Hoberg Paper Mills, Inc.	Div. "B"	Green Bay, Wis.
Strathmore Paper Co.	Woronoco	Massachusetts
Price Brothers & Co., Ltd.	Jonquiere	Quebec, Canada
Container Corp. of America	Fernandina	Florida
The Lawrence Paper Co.	Lawrence	Kansas
*Central Fibre Products Co.	Quincy	Illinois
The Crystal Tissue Co.	Middletown	Ohio
The Mead Corp.	Harriman Div.	Harriman, Tenn.
American Writing Paper Corp.	Riverside #3	Holyoke, Mass.
GROUP D		
Container Corp. of America	Circleville	Ohio
American Writing Paper Corp.	Parsons Div.	Holyoke, Mass.
The Wisconsin River Paper & Pulp Co.	Stevens Point	Wisconsin
The Flintkote Co.	Little Ferry	New Jersey
*Central Fibre Products Co.	Tama	Iowa
Marathon Paper Mills Co.	Ashland	Wisconsin
American Writing Paper Corp.	Crocker Div.	Holyoke, Mass.
American Writing Paper Corp.	Nonotuck Div.	Holyoke, Mass.
U. S. Gypsum Co.	North Kansas City	Missouri
American Asphalt Corp.	Kansas City	Missouri
*Fort Orange Paper Co.	Box Board Mill	Castleton on Hudson, N. Y.
Rogers Fibre Co., Inc.	Fibreboard Mill Div. 1	Bar Mills, Me.
Spaulding Fibre Co., Inc.	Milton	New Hampshire
Union Bag & Paper Corp.	Allen Paper Mill	Hudson Falls, N. Y.
*Central Fibre Products Co.	Vincennes	Indiana
American Writing Paper Corp.	Mt. Tom Div.	Holyoke, Mass.
*Central Fibre Products Co.	Denver	Colorado
*International Paper Co.	Riley #22	Riley, Me.

Division II—Paper and Board Re-Manufacturing

Bird & Son, Inc.	Roofing Plant	Shreveport, La.
Container Corp. of America	Cincinnati	Ohio
*Fort Orange Paper Co.	Paper Box Plant	Castleton on Hudson, N. Y.
Kimberly-Clark Corp.	Atlas Mill	Appleton, Wis.
Container Corp. of America	Baltimore	Maryland
Iowa Fiber Box Co.	South West Box Co.	Keokuk, Iowa
Thilmany Pulp & Paper Co.	Bag Mill	Kaukauna, Wis.
Container Corp. of America	Natick	Massachusetts
Iowa Fiber Box Co.	Keokuk	Iowa
Bay West Paper Co.	Green Bay	Wisconsin

***August report missing—covers one month only.**

This Simple Test Shows Why the CONCAVE SIDE Cuts Belt Costs!

What Happens When a V-Belt Bends

FIG. 1

FIG. 2

If you care about belt costs, pick up any V-belt you have handy and make this simple test:—

Bend the V-belt while you grip its sides and you will feel how the belt changes shape. The top, under tension, narrows. The bottom widens. The sides of the belt bulge out. Clearly, if its sides were straight to begin with, the bent belt is forced into a shape that does not fit the sheave groove—as shown in figure 1, on the left.

Now, bend a V-belt built with the patented Concave side. You get the same shape change, but now the new shape exactly fits the sheave groove—as shown in figure 2. There is no side-bulge. Results? (1) Uniform side-wall wear—longer life! (2) The belt gets a full side-width grip on the pulley—carries heavier loads without slippage. This cuts belt costs and saves power.

Only belts built by Gates are built with the Concave side, which is a Gates patent.

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NAMES *in the* NEWS

Personals

HAROLD MOORHEAD NEW RES. ENGINEER AT POWELL RIVER

Harold Moorhead has arrived at Powell River, British Columbia, to assume his new duties as resident engineer at the pulp and paper mill of the Powell River Company, Ltd. Mr. Moorhead has been closely affiliated with the industry since his graduation as a mechanical engineer from the University of British Columbia in 1933.

Previous to his new position, Mr. Moorhead has been associated with the engineering department of the Ontario Paper Company's mill at Thorold, Ontario; the engineering staff of the Quebec North Shore Paper Company in constructing the plant at Baie Comeau; and the engineering staff of the British Columbia Pulp & Paper Company at Port Alice, British Columbia.

◆

▶▶▶ The Bailey Meter Company, Cleveland, Ohio, has opened additional branch offices on the West Coast in Los Angeles, California, and Seattle, Washington. *L. F. Richardson* has been appointed as branch manager of the Los Angeles office and *H. T. Sawyer* as branch manager of the Seattle office.

Mr. Richardson and Mr. Sawyer had previously been located in Los Angeles and Seattle, respectively, but had functioned as representatives of the San Francisco office. *V. A. Rumble,* manager of the company's office in San Francisco, will continue as West Coast supervisor.

◆

FRED G. STEVENOT SUCCEEDS THE LATE OSSIAN ANDERSON

The Board of Directors of the Puget Sound Pulp & Timber Company of Bellingham, Washington, has elected Fred G. Stevenot of San Francisco to succeed the late Ossian Anderson as president of the company (See *Necrology*).

Mr. Stevenot has been a director of the company since 1937, and is chairman of the Board of the company's subsidiaries, Canadian Forest Products, Ltd., and Beaver Cove Timber Company, Ltd. He was formerly Director of Forestry of the State of California, member of the California Railroad Commission, and vice president of the Bank of America. At present he is a director of several California companies. Lawson Turcotte, associated with Puget Sound since 1926 and secretary-treasurer since 1934, was elected a director and executive vice president. Walter DeLong, operating manager since 1929, was elected vice president.

◆

▶▶▶ The advancement of *John F. Devine* to operating vice president of the General Printing Corporation, New York City, was announced on September 16 by Albin K. Schoepf, president.

◆

DR. L. V. FORMAN ADDED TO RESEARCH STAFF OF INSTITUTE

Westbrook Steele, executive director of The Institute of Paper Chemistry, has just announced the appointment to the Institute's staff of Dr. Loren V. Forman as a research associate, who will be instructor in pulp and paper technology and in charge of pulp and paper testing.

Dr. Forman is a native of Iowa and received his undergraduate training at Iowa State College, receiving a B.S. in chemical engineering in 1934. He is an alumnus of the Institute, receiving his M.S. degree in 1936, and his Ph.D. degree in 1940. His Master's thesis was on the bonding strength of adhesives; his Doctor's work dwelt with the effect of ultraviolet light on lignin. During this period he spent two years with The Munising Paper Company, Munising, Michigan.

Dr. L. V. Forman

While a third year student at the Institute, Dr. Forman was awarded a fellowship of the American-Scandinavian Foundation of New York City, giving him the opportunity of studying at any Swedish school and of observing pulp and paper manufacturing at first hand in the Scandinavian countries. He arrived in Stockholm early in September, 1939, and had just started a research problem under Professor Erik Haegglund of the Institute of Wood Chemistry and Pulp Technology at the Royal Institute of Technology at Stockholm when conditions resulting from the War made it necessary for him to return to the United States in December, 1939.

Since 1940, Dr. Forman has been associated with The Mead Corporation, dividing his time between the Chillicothe, Ohio, and the Kingsport, Tennessee, mills.

◆

▶▶▶ The Upson Company, Lockport, New York, has granted *Harry Sherman Cutler,* superintendent, leave of absence, enabling him to go to Washington, with the rank of major, to serve in the Army Service of Supply Division under Lieutenant-General Brehon V. Somervell. A native of Springfield, Vermont, Major Cutler is a graduate of Purdue University and was a second lieutenant in World War I. He has been affiliated with Upson for five years.

◆

R. S. MADDEN NEW PRESIDENT VALLEY PAPER CO.

Vice president of the Mohawk Paper Company at Cohoes, New York, Russell S. Madden has been named president of the Valley Paper Company of Holyoke, Massachusetts. He succeeds the late George Stanley Morse. (See *Necrology.*)

Born in Detroit, Michigan, Mr. Madden began his career as a paper executive with the Garnett Allen Paper Company, St. Louis, Missouri, in 1909. He was manager of the New York

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Jones' research has contributed many of the engineering refinements that have brought stock preparation equipment to its present high efficiency. "Know-how" also is the reason for the marked progress of Jones' workmanship in building equipment with precision accuracy. Today . . . called upon to extend ourselves largely to capacity efforts in the production of war equipment, our entire organization is devoting the utmost ability and endeavor to the supreme task of victory.

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office of the Graham Paper Company of St. Louis from 1911 to 1923, when he joined the American Writing Paper Corporation of Holyoke, as assistant sales manager, later becoming vice president in charge of sales. He resigned a year ago to join Mohawk. Mr. Madden has served as president of the Writing Paper Manufacturers' Association and of the Cover Paper Manufacturers' Association.

◆

▶▶▶ September 5 was an important day in the life of *August Beeler* of Fairview, Massachusetts, for it marked his 50th anniversary as an employee of the Whiting Paper Company, Holyoke, Massachusetts. He began work at the Whiting Paper Company on his 19th birthday, and despite his 68 years, is at work each morning at 5:45. He has served under three generations of the Whiting family, and has been foreman of the dry loft for the past 28 years.

◆

UNION BAG TO STUDY POST WAR PLANNING

A new position—manager of Post War Planning—has been announced by Union Bag & Paper Corporation, New York City. The duties of this position will be to study "social, political, and economic changes and their possible effect on all departments of our company," according to a statement by Alex Calder, president. Donald Johnson Hardenbrook, until recently chairman of the Board of the Institute of Applied Econometrics, New York City, has been appointed to the post.

Mr. Hardenbrook was associated with Dr. Charles F. Roos in economic research at the Institute. He has spent 25 years in banking and investment banking. A member of the New York Stock Exchange since 1933, he is a great-great-grandson of one of the 24 brokers who on May 17, 1792, signed the original agreement under the buttonwood tree which marked the founding of the Exchange.

D. J. Hardenbrook

◆

E. HOWARD SMITH SUCCEEDS WELDON AS ASS'N PRESIDENT

To succeed R. L. Weldon, who has been appointed newsprint administrator of the Canadian Government, E. Howard Smith, vice president of Howard Smith Paper Mills, Ltd., Montreal, has been elected president of the Canadian Pulp and Paper Association.

Mr. Weldon automatically becomes senior vice president, on leave of absence, of the Association. His duties will be performed by C. R. Whitehead, vice president of Consolidated Paper Corporation, Ltd., Montreal, who has been elected special senior vice president. F. G. Robinson, vice president of Canadian International Paper Company, Montreal, will continue as one of the vice presidents. Mr. Robinson is a past president of the Association.

◆

▶▶▶ Succeeding the late Francis J. Arend, *H. L. Watson* has been elected president of De Laval Steam Turbine Company of Trenton, New Jersey. He has been with the company since 1913, serving as general sales manager from 1913 to 1934 and executive vice president and director since that time. Mr. Watson was graduated from Rose Polytechnic Institute, Terre Haute, Indiana, in 1905, and was employed at the Allis-Chalmers Manufacturing Company in Milwaukee, Wisconsin, until he joined De Laval.

◆

F. P. DOANE, JR., GOES TO SANDY HILL

Sandy Hill Iron & Brass Works, Hudson Falls, New York, recently announced that Foster P. Doane, Jr., widely known in engineering and papermaking circles, has joined its organization. He has been general superintendent of the Fort Edward mill of the International Paper Company, where he was in charge of production as well as engineering.

At Sandy Hill, Mr. Doane will have charge of the inspection of equipment produced by sub-contractors, and will also supervise the careful scrutiny and checking of completely assembled products as they leave the Sandy Hill assembly lines.

F. P. Doane, Jr.

An engineer, Mr. Doane is a graduate of Massachusetts Institute of Technology, class of 1920. After graduation, he was engaged in business with his father, Foster P. Doane, Sr., in sales and mechanical development work for the textile industry. From 1930 to 1935, he was research engineer in the research division of International Paper Company, working on production problems in the company's mills in the eastern United States and Canada. He was assigned to the Fort Edward mill in 1935, first as technical superintendent, and two years later he became general superintendent. Mr. Doane is secretary and treasurer of the New York-Canadian Association, and is a member of the executive council of the Empire State Section of TAPPI.

◆

▶▶▶ Sales manager of the Construction Machinery Division of Chain Belt Company of Milwaukee, Wisconsin, *A. W. Thomas* has left for Washington, D. C., where he will be a "dollar-a-year" man as consultant for the Construction Machinery Division of the War Production Board.

◆

G-E PRES. WILL SERVE AS HEAD OF WPB EXEC. COMM.

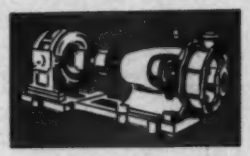
Announcement was made September 17 of the appointment of Charles E. Wilson, president of the General Electric Company, Schenectady, New York, as vice chairman of the War Production Board, in that capacity acting as chairman of the newly organized Production Executive Committee.

On September 18, at a special meet-

MARS IS A GREAT TEACHER, *too!*

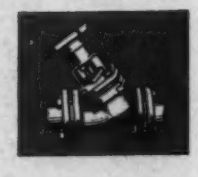
War has not demanded that we convert our plant to ordnance or ammunition. We are making no guns, no tanks, no ships, no planes.

On the contrary, War has required that we speed up production of our regular lines of Durco Products—corrosion-resistant equipment made of the high-silicon irons, Duriron or Durichlor, or the chrome-nickel stainless steels, Durimet and Durco KA2S and Durco KA2SMo.



For Durco Products are essential to many of the vital war-time industries, such as explosives, chemicals, steel, synthetic rubber, fertilizer—yes, and paper.

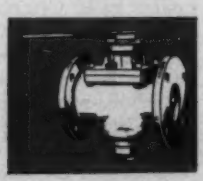
Research and new developments are going hand in hand with production at Duriron. The demands of war are enlarging the usefulness of Durco equipment for peace-time industries.



The streamlined Model 40 Durcopumps, with their feature of convertibility are a great improvement over previous centrifugal pumps.

Durco valves are also of improved design. For instance, the Durco Y Valve has full opening with nearly straight flow and a stem so guided as to insure perfect seating always.

The new plug valves may be furnished with stainless steel bodies and Duriron or Durichlor plugs which are especially hard and resistant to abrasion and scouring. This is a long-wearing feature exclusive with Durco valves.



If your equipment is being destroyed by corrosion, bring your problem to our technical men for analysis and recommendations.

The Army-Navy "E" was awarded September 12th to the Men and Women of The Duriron Company for high achievement in war production.

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THE DURIRON COMPANY, INC.

DAYTON, OHIO, U.S.A.

ing of the board of directors of General Electric, Mr. Wilson's resignation as president and director of the company was regretfully accepted. Philip D. Reed, chairman of the board, is also in the service of the Government, therefore, Honorary Chairman Owen D. Young and Honorary President Gerard Swope were requested to resume their original responsibilities, Mr. Young as acting chairman and Mr. Swope as president of the company.

◆

RALPH BRADFORD ELECTED G. M. OF U. S. CHAMBER

As a step in the general reorganization of the Chamber of Commerce of the United States, the board of directors has appointed Ralph Bradford as general manager. At the same time, the board authorized a number of important changes in the organization's set-up, putting major activities under twelve main groupings, all under the direction of Mr. Bradford.

Mr. Bradford has been secretary of the Chamber since 1939. For a number of years before becoming secretary, he was manager of the Chamber's Commercial Organization Department. Prior to that, he was engaged in local chamber work in Texas.

◆

▶▶▶ The Detroit Rex Products Company, Detroit, Michigan, has recently announced the appointment of *A. O. Thalacker* as general manager. Mr. Thalacker has been a company executive for the last five years, and lately has been secretary, a position he retains in addition to his new responsibility.

◆

▶▶▶ The Chemical Industry Medal will be awarded to *Dr. Harrison E. Howe*, editor of *Industrial & Engineering Chemistry*, at the joint meeting of the Society of Chemical Industry and the American Chemical Society on November 6.

◆

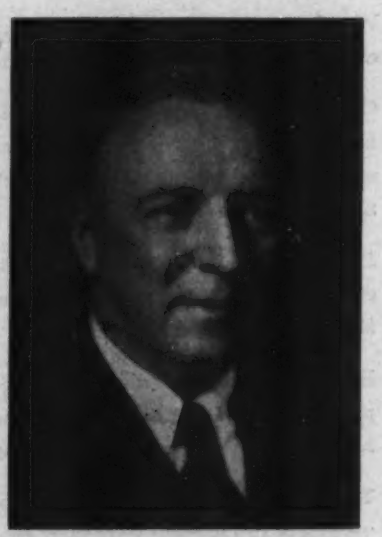
▶▶▶ The following new members were elected to the Board of Directors at the annual meeting of the voting trustees of Brown Company, Berlin, New Hampshire: *H. P. Carruth*, vice president and general manager of the company; *J. B. Challies*, vice president of Shawinigan Water & Power Company, Montreal; and *Paul A. Draper*, Boston, Massachusetts. *H. P. Kendall* was elected Chairman of the Board. He is president of the Kendall Company, Boston, and Bauer & Black, Inc., Chicago. Retiring board members include *William De Krafft*, New York City; *George A. Morris*, vice president and general manager, The Ogilvie Flour Mills Company, Ltd., Canada; and *Serge Semenenko*, vice president, First National Bank of Boston.

Necrology

OSSIAN ANDERSON

Ossian Anderson, president of the Puget Sound Pulp and Timber Company of Bellingham, Washington, and of the Canadian Forest Products, Ltd., passed away in Vancouver, British Columbia, September 21.

One of the most prominent pulp and lumber company executives on



Ossian Anderson

the Pacific Coast, Mr. Anderson was also vice president and director of the St. Regis Paper Company of New York City and vice president and general manager of the St. Regis Kraft Paper Company of Tacoma, Washington. He had planned to build another large pulp mill in British Columbia and had obtained large timber stands at Inglewood, British Columbia, for that purpose.

Mr. Anderson was 49 years of age; he came from Sweden at the age of 17. He is survived by his widow, two sons, and a daughter.

◆

▶▶▶ Widely known industrial labor consultant, *T. A. McDonald* passed away on September 17. He carried on consulting work for many of the large paper companies in Canada and in the United States. They included the Abitibi Power and Paper Company, Anglo Canadian Paper Company, Anglo Newfoundland Company, Ontario Paper Company, Quebec North Shore Paper Company, all in Canada, and the Oxford Paper Company, Brown Paper Company, The Riegel Paper Company, and the New York and Pennsylvania Paper Company, in the United States.

◆

FRANK A. BORCHERS

Frank A. Borchers, well known paper company executive, passed away on September 5 in Chicago. He was general sales manager of the Oxford Miami Paper Company, West Carrollton, Ohio, and Western sales manager of the Oxford Paper Company of Rumford, Maine.

During World War I, Mr. Borchers was sales manager of the Menasha Paper Company's mill at Ladysmith, Wisconsin, before the Western Newspaper Union purchased it. Later he was associated with the Seaman Paper Company of Chicago, and then he joined the Oxford Paper Company, with whom he has been affiliated for the past 13 years.

He was 59 years of age and is survived by his widow.

◆

GEORGE S. MORSE

President of the Valley Paper Company of Holyoke, Massachusetts, George Stanley Morse passed away on September 4.

Mr. Morse was born in Melrose, Massachusetts, in 1879, attended Boston Latin School and Harvard University. Shortly after graduation, he became associated with the Valley Paper Company as a salesman. Mr. Morse became vice president in 1916 and president in 1930.

Sixty-three years of age, he is survived by his widow and a daughter.

◆

F. L. OUTTERSON

Frederick Leslie Outterson, 71, widely known inventor of a number of paper manufacturing processes, passed away October 1 in Holyoke, Massachusetts. Mr. Outterson's family has long been prominent in the industry. His grandfather, Andrew A. Outterson, was a pioneer in the making of the currency paper now used in this country (with the silk fiber impregnated in the finished paper). He also developed the autographic red process for the Eastman Kodak Company and was co-inventor of a process for deckling paper.

Born in Holyoke, Mr. Outterson left school in 1887 to join his father, the late Charles A. Outterson, at that time superintendent of the original Crocker Manufacturing Company,

later a division of the present American Writing Paper Corporation. He became superintendent of the Crocker No. 2 mill at the age of 19, and later was superintendent of the Oakland Division of A.W.P. at South Manchester, Connecticut. Other mills with which he was associated as superintendent include the Whiting Paper Company of Holyoke, Crane Paper Company of Westfield, Riegel Paper Corporation of Riegelsville, New Jersey; and the Aetna Paper Company of Dayton, Ohio. An expert on color mixing, Mr. Outterson was often engaged as consultant and advisor by many mills.

Surviving are two sons.

◆

▶▶▶ *J. Munson Gamble,* 76, passed away on September 25 in Watertown, New York. Mr. Gamble had been connected actively with the manufacture of paper since 1891, when he entered the employ of C. R. Remington & Son, for whom he worked in the Harrisville, New York, area in charge of lumbering and surveying operations. In 1892, with Charles H. Remington, he organized the Brownville Paper Company, with Mr. Remington as president and he as secretary-treasurer. In 1901, with his brother, C. W. Gamble, he organized the Brownville Board Company, and established one of the most modern mills in the Black River Valley, New York.

◆

EDWARD W. P. SMITH

Edward W. P. Smith, consulting engineer for The Lincoln Electric Company, Cleveland, Ohio, passed away suddenly on September 19 as he was returning to Cleveland from Indianapolis, where he had addressed a meeting of the American Welding Society.

Mr. Smith was born in Cleveland and was graduated from Colorado College, Colorado Springs, Colorado, with a degree in electric engineering. Before joining Lincoln Electric as a tester, he had worked in the electric inspection department of the City of Cleveland and for the Westinghouse Electric and Manufacturing Company in Pittsburgh. Mr. Smith had been with The Lincoln Electric Company more than 20 years, and had traveled extensively in the last year in the interests of the war production program. He was a member of the American Welding Society, the American Society of Mechanical Engineers, the American Society of Testing Materials, and the Cleveland Engineering Society.

He was 56 years of age. His widow and six children survive.

"Ships and Shoes and Sealing Wax" all know MORRIS Pumps

. . . because these widely popular units are used in the marine, leather, and petroleum industries as well as in paper and pulp mills and every other field.

Morris has always specialized in the "hard-to-handle" services . . . heavy clogging pulp, chemical liquids, abrasive mixtures, etc. The authoritative recommendations of the Morris engineers for paper and pulp mill pumps are based on 70 years of experience in building pumps for this industry, and are at your service to help you solve your particular pumping problems.

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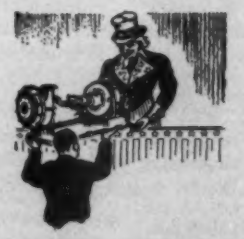

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We have placed at the disposal of the Government all our facilities that might be of use in the national war effort. But our remaining facilities are at your service, and also the advice of our engineers to help you secure best results from your present equipment and to plan for your future needs.

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CENTRIFUGAL PUMPS

Convention Papers . . . Abridged

Enzyme Conversions

E. P. GILLAN
Corn Products Div., Anheuser-Busch, Inc.

During the past few years the converting of starch with enzymes has received consirable attention in the paper industry, and the results have not always been wholly satisfactory, particularly with cornstarch. The interest in converting low-priced starches came about originally because of the comparatively high price of chlorinated starches, and later because it was felt their production might be restricted or abandoned altogether. Similarly, an interest in cornstarch for conversion with enzymes came about when it was thought that tapioca starch would no longer be available, the supply limited, or the price prohibitive. Cornstarch has proved highly satisfactory in some cases, so much so that it will not be displaced by chlorinated starches or tapioca when the supply or price of either or both returns to normal or prewar standards.

There will be fewer failures and greater interest in enzyme conversions if their nature is fully understood, and it will be the object of this paper to bring this about.

When a suspension of native starch is heated, a very slight and hardly noticeable swelling takes place at a point some 8 or 10 Fahr. below that of "definite swelling." It will be apparent if one attempts to pass the starch suspension through a No. 17 silk sieve. This may be termed the temperature of "incipient gelatiaization." The swelling increases rapidly as the temperature rises and reaches its peak or point of maximum viscosity at that of "complete gelatinization." Upon continued heating the paste thins somewhat, but not to any great extent until it is boiled, which results in the mechanical breaking of the gel with a deposit of "sludge." All this is best observed at concentrations no higher than about 7 per cent. With concentrations about that (assuming of course that no enzyme is present) the paste will be too heavy at its point of maximum viscosity for proper agitation or uniform heat transfer. The completely gelatinized and fluid starch "solution" will set to a rigid gel on cooling and standing, the increase in viscosity as the temperature falls being most pronounced.

The above features of native or unmodified starch constitute both its strength and its weakness, depending upon the use to which it is to be put. Where a thick gel or paste of low-solid content is desirable, or not objectionable, or where it can be distributed in its ungelatinized state, later to impart great bonding strength upon gelatinization with a minimum amount of water, it is obvious that these features of native starch are of great value. Examples are its use in beaters, as the adhesives in the manufacture of corrugated board, pie filling, salad dressing, etc. But the necessity for such a large amount of water to attain a paste of sufficient fluidity for application to a surface, the small amount of solids which results on drying and the fact that it gels with the slightest fall in temperature, shuts it out from many industrial applications.

In thin-boiling or acid-modified starch much heavier concentrations may be used, but all the other features of native starch are unchanged, including that of "setting back" to a gel. The dextrine or acid-roasted process effects a modification of starch that, in the case of yellow or "Canary" dextrines, is virtually complete in the elimination of set back, viscosity stability at room temperatures, and fluidity at high concentrations. But it is no longer starch and it has none of the properties of starch. It is a dark colored dextrine, completely soluble in cold water. The partially dextrinized "white" grades are merely mixtures of soluble dextrine and modified starch, the latter still retaining the set back or gel features of native starch. Only in chlorinated starch or in the product of a properly conducted enzyme conversion is the viscosity or body of the starch reduced so that it is fluid at high concentrations, exhibits no tendency to gel, or at least has this property controlled to the desired point and presents a homogenous film on drying.

The starch granule is composed of two fractions which have been termed alpha- and beta-amylose or amylopectin and amylocellulose, the latter often referred to simply as amylose. Sometimes they are called the "insoluble" and "soluble" portions, terms which are descriptive in a general way; but starch in any form is not soluble in the true meaning of the word. A third or gamma fraction of interest to those engaged in fundamental research, need receive no consideration here.

The alpha fraction is responsible for the high viscosity of a starch paste and for the gel. The beta portion produces a uniform colloidal solution, is capable of fairly high concentrations, will not gel and presents a continuous film on drying.

The function of the enzyme in preparing a starch for tub sizing, calendering, and perhaps coating in the paper mill, and for other similar purposes, is to convert the alpha portion of the starch to a condition approaching the beta, if not actually identical with it, either completely or to some intermediate point as determined by the requirements of the paper mill. The action of the enzyme, however, must be confined solely to liquefaction of the alpha fraction, the beta being left unimpaired.

Fortunately, enzymes are now available, which are not only of standard strength or potency, but whose action is confined almost entirely to liquefaction. Furthermore, while saccharification can only take place on a starch which has been gelatinized, liquefaction starts as soon as the point of incipient gelatinization is reached, and continues to the temperature at which the enzyme is destroyed if a margin of unliquefied material still exists at this point. Complete gelatinization, however, must have been attained before the enzyme is destroyed or the liquefaction will not be complete. Neither will it be complete if sufficient time has not been given at each point of the rise in temperature from the start of gelatinization, for it is characteristic of all enzymes that a function is performed at each point in the temperature rise which is destroyed after that point is passed. The time element from the start of gelatinization to its completion is of vital importance, if enzyme conversions are to be satisfactory and uniform. It must be sufficient for the enzyme to do its work, and a standard must be maintained to insure uniform results. The enzyme manufacturers have done an excellent job in the production of suitable and standard enzymes. They have done much to simplify the process of conversion, but in their anxiety to come as near as possible to the simple cooking required for chlorinated starches they have rather overstepped themselves in their recommendations as to the use of their product. More time and attention must be given to the initial stages of the conversion.

The gelatinization temperatures of corn and tapioca starches are 167 and 155 Fahr., respectively. When tapioca starch was in general use for enzyme conversions, the enzymes employed attained their maximum activity at 158 Fahr. and were completely inactivated at 165 Fahr. Tapioca, therefore, with its point of complete gelatinization of 155 Fahr., was a "natural" for these enzymes, to say nothing of the fact that root starches are by their very nature more susceptible to enzymes than those derived from grain. Cornstarch, on the other hand, attained complete gelatinization only after the enzyme was destroyed. To use cornstarch successfully only two courses were open—to depress its gelatinizing point to conform with the enzyme or to produce an enzyme which would be active at the higher temperatures. This the enzyme manufacturers have done, but the cornstarch manufacturer also has contributed to the solution of the problem. Each manufacturer has developed his own method for conditioning cornstarch for enzyme conversions. The paper mill operator should choose the enzyme he finds most suitable for his purpose.

The presence of extraneous nonstarch substances, both organic and inorganic, in

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Some of the papers presented at the fall meeting of the **Technical Association of the Pulp and Paper Industry** held at Boston, Massachusetts, September 29-October 1, 1942, have been abridged, and condensations of these papers will appear from month to month until completed. This is the first installment.

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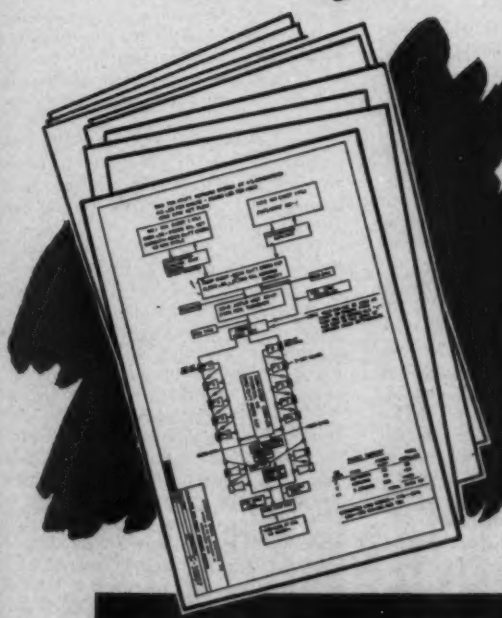

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For us, this unfortunate situation is both a challenge and an opportunity . . . a challenge to help you solve the problem . . . an opportunity to place our entire engineering staff at your disposal without charge, even though we realize we can't sell you a thing.

Perhaps you are thinking of changing over from over-old grades to grades with a stronger demand. Or perhaps you are considering the working up of your own tonnage instead of selling it in rolls. On these problems and others, you will find Black-Clawson-Shartle-Dilts of valuable help.

We can answer questions on stock preparation variations on techniques with which you are not familiar, on paster or waxer adjustments, on new uses for your present machinery, etc. A business lifetime has been devoted to just such problems and that experience is yours for the mere asking.

This is our big opportunity to repay you for past favors. Your inability to obtain high priorities makes us less eager to serve you. Write us, asking us to get in touch with you.

The Black-Clawson Co., Hamilton, Ohio
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amounts that may be termed minute, have a decided influence on enzyme activity, either as activators or as retardants. If activators, their presence would seem to be an advantage, either in shortening the converting time or permitting the use of less enzyme. This immediately suggests the addition of activating substances to the starch or the suspension. The presence of activators or retardants in an enzyme conversion, whether as "impurities" in the starch or by purposeful addition, is fatal to the attainment of a uniform product unless perhaps accompanied by an elaborate control of the conversion, which we are trying to avoid.

The shorter the converting time, and more rapid the action, the more difficult and less sensitive is the control, and the same thing applies to lesser amounts of enzyme. But of far greater importance is the fact that the amount of activating or retarding impurities in starch can never be controlled with the degree of sensitiveness necessary for uniform conversions. This applies to chemicals which might be added to starch or to the slurry as well as to nonstarch substances derived from corn and not completely removed. My personal belief is that uniform and satisfactory results with enzyme conversions are best attained with starch that is as free as possible from all nonstarch substances, and with water that as nearly as possible approaches distilled. All I have said of impurities in starch applies also to the water in which it is suspended, though this much may be said for the water—that it will probably always be uniform at any one mill.

This paper should conclude with some specific suggestions and recommendations applicable to mill operations.

The starch suspension should first be adjusted to a *p*H of 6.5, and the temperature raised by means of live steam introduced through a Pemberthy injector. The enzyme may be added at any point before the temperature reaches 100 Fahr. I prefer adding it at 100 Fahr. From that point on a definite time schedule should be followed, and the temperature raised uniformly and not too rapidly to 158-160 Fahr., or when the starch begins definitely to thicken. I would suggest a period of 30 minutes for the rise from 100 to 158 Fahr. Starch concentrations of 30 per cent or over require as high as 50 minutes in order to derive full advantage of the enzyme action during the earlier stages of gelatinization. Otherwise the paste will be too thick for proper agitation when it reaches 158-160 Fahr.

The paste is held at 158-160 Fahr. for 15 minutes, during which there is a pronounced thinning. The agitation should be sufficient to effect a rapid distribution of heat throughout the batch during the thickest stage. After 15 minutes at 158-160 Fahr. the temperature is raised over a standard time period of not less than 15 minutes to 166-168 Fahr. which may be termed the "converting" temperature.

At this temperature the batch may be held from 15 to 30 minutes, depending upon the viscosity desired. This viscosity is also controlled by the amount of enzyme used. The action is most rapid during the first 15 minutes and slows down considerably at 30 minutes. This is true for all but one of the enzymes studied. For this reason I prefer a converting time of 30 minutes, controlling the viscosity by the amount of enzyme used.

At the end of the converting period, the temperature should be raised to 200 Fahr., and held for at least 5 minutes before the batch is used.

If this procedure is followed, enzyme conversions should be perfectly satisfactory and consistently uniform. It may take a little experimenting and a little patience to adapt them to the equipment and needs of a particular mill, but after that they should present no difficulty.

Recent Developments in the Treatment of Papermill Water

ESKEL NORDELL, Technical Dept.
The Permutit Company

Most of you are familiar with the general design and principles of operation of the Spaulding Precipitator. Essentially, it consists of two compartments; one for mixing and thoroughly agitating by mechanical means the raw water, treating chemicals and previously formed sludge and the other for settling and filtering the treated water upwardly through a suspended blanket of sludge.

By varying the dosages of chemicals in the Spaulding Precipitator, the degree of softening accomplished may be varied to any degree required down to an ultimate limit of about 1 grain per gallon (17 ppm). Thus, for many mill purposes, reduction of the calcium alkalinity to 2 grains per gallon (35 ppm) is sufficient to stop scale formation in condensers, on other water jacketed equipment, hot water piping, stock chests, deckers, screens, recirculating systems, bleach tanks, etc.

This degree of softening may be accomplished at a very low cost and this is especially the case with mills equipped with causticizing equipment as these may recover both the lime added to accomplish the softening and that removed from the water. In other words, almost twice as much lime may be recovered as is used in the treatment.

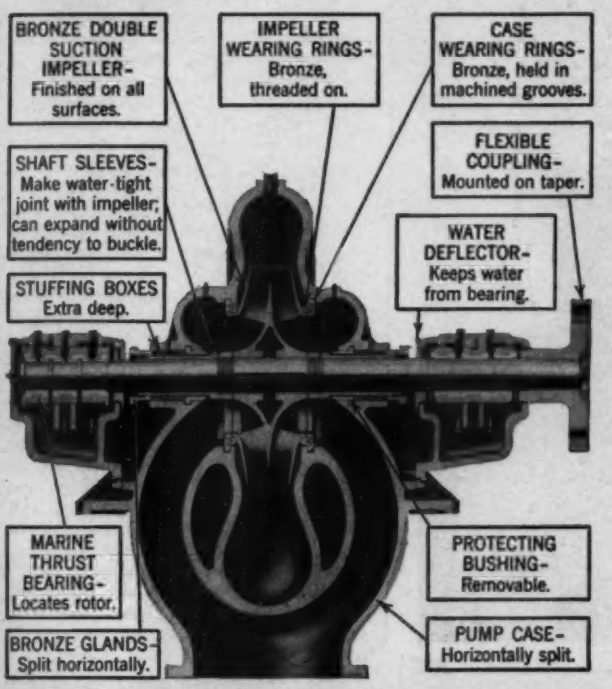
On the other hand, if removal of magnesium hardness or permanent hardness is required for certain purposes, this may be accomplished by using soda ash and larger amounts of lime.

Many water supplies contain a sufficient content of silica to form silica scale in high pressure boilers and turbines. Such scales are exceedingly hard and troublesome; have a low thermal conductivity and are difficult to remove. In the Spaulding Precipitator, the silica content of such waters may be reduced to any desired degree by using dolomitic lime in place of high calcium lime in the softening process. This process of silica removal has the additional advantage of not increasing the dissolved solids content of the softened water.

By carrying out the coagulation of turbid or colored waters in the Spaulding Precipitator, a very efficient removal of the turbidity and color may be accomplished with a minimum amount of coagulant. A further advantage of using the precipitator for this purpose is that because of the low turbidity of the precipitator effluent, as com-

SUSTAINED EFFICIENCY

OF DE LAVAL PUMPS


BRONZE DOUBLE SUCTION IMPELLER- Finished on all surfaces.
IMPELLER WEARING RINGS- Bronze, threaded on.
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SHAFT SLEEVES- Make water-tight joint with impeller; can expand without tendency to buckle.
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MARINE THRUST BEARING- Locates rotor.
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is due to proper hydraulic design, which avoids cavitation and pitting, and particularly to renewable *LABYRINTH WEARING RINGS*, which protect casing and impeller from erosion and reduce leakage from discharge to suction.

With De Laval *LABYRINTH RINGS* there is only about one-third as much leakage as between plain rings having the same radial clearance, or for the same initial efficiency De Laval pumps can have greater clearances than can pumps with flat rings. Because of the reduced leakage there is less erosion of De Laval rings than of flat rings and efficiency is better sustained. De Laval pumps which have been in continuous service for many years without renewal of parts still equal their original efficiencies, as demonstrated by numerous tests.

All parts of De Laval pumps are interchangeable on a limit gage basis and renewals ordered by number require no fitting.

State your pumping conditions and ask for Publication P-3222.

Three De Laval units in a water works plant. The largest, rated at 38,000 g.p.m. against 160 ft. at 600 r.p.m., showed on the acceptance test an overall efficiency, including motor, of 88.0 per cent.

Section through labyrinth wearing rings

Labyrinth type protecting ring

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Improve Strength
PQ SILICATE AID
If you need higher "pop" test, investigate how the proper use of PQ Silicate in the beater helps to attain it.
A mill owner using silicate for 30 years says: "...the percentage of pop-test readings to basis weight is considered to be increased by an average of five points.....Occasionally a paper may run too low in strength and an increase of silicate alone in the furnish will raise the test one or two pounds or even more."
We'd like to send you more information on this and other advantages of PQ Silicate.
PQ SILICATES OF SODA
Philadelphia Quartz Company, Manufacturer
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pared with the older types of coagulation equipment, the load on the filters is greatly reduced and the periods between backwashings is greatly increased.

Some waters contain objectionable tastes and odors which may be adsorbed by the pulp or paper being manufactured. The use of powdered activated carbon for removal of such tastes and odors from water is common practice. Due to the extremely intimate contact provided, the use of the precipitator for this purpose has been found to effect economies of from 3 per cent to 40 per cent in the dosage of activated carbon required.

The Spiractor is a recent development in lima soda water softening equipment and this was first described in a paper by H. L. Tiger and M. E. Gilwood at the annual TAPPI meeting last February. This consists of an inverted conical tank in which the softening reactions take place in the presence of a suspended bed of granular calcium carbonate catalyst.

The remarkable features of this type of softening equipment are its small size—5 to 10 minutes detention period—and that the precipitant and removed hardness are discharged in a granular form instead of as the usual wet, pasty sludge. This granular material is extremely easy to handle as it drains to less than 5 per cent of moisture in a relatively short period and, consequently, it can be handled much like a slightly damp sand.

This granular product is formed by the precipitating materials separating out as accretions on the fine granules of calcium carbonate catalyst in the Spiractor. Consequently these grow in size and as the bulk of material in the Spiractor increases, its level is kept down within certain limits by withdrawals of the largest particles from the bottom. Periodic additions of new catalyst are also required.

This new catalyst may be made by regrinding and screening a portion of the discharged material. Where removal of only the calcium hardness is required, the discharged material may be reburned thus recovering lime from both the added materials and that removed from the water.

Troublesome mud ball formations on filter bed surfaces are not a new phenomenon. Instead, they have been known ever since filter beds were first put into operation and various efforts have been made to get rid of them.

The rotary surface washer represents a recent development. It consists of a pair of rotating horizontal pipe arms supported directly above the top of the bed by a ball bearing made of rustless material.

A single row of jets, on the opposite side of each arm, discharges the water at high velocity downwardly and backwardly. The reaction of these jets, which are directed at an angle to the surface of the filter bed, causes the two arms to revolve and, during the revolution, the nozzles on the arms are thus moved through concentric circles. At the end of each arm there is a nozzle, pointing radially outward and downward which cleanses the sand adjacent to the filter walls and reaches the sand in corners of rectangular filters.

The water used in the rotary washer should be under a minimum of 50 psi pressure and this water, issuing from the jets at high velocities, disintegrates mud balls and thoroughly scours the sand. Yet the amount of water actually used in the rotary surface washer is very small—only 0.5 to 1 gpm per sq. ft. of filter bed area. These washers may be employed in either pressure or gravity types of filters and the results obtained have been excellent.

While the old siliceous types of zeolite may be operated only on the sodium cycle, the recently developed carbonaceous or organic zeolites may be operated on either the sodium cycle or the hydrogen cycle. On the sodium cycle, they are regenerated with common salt; on the hydrogen cycle, with a mineral acid, usually sulphuric acid.

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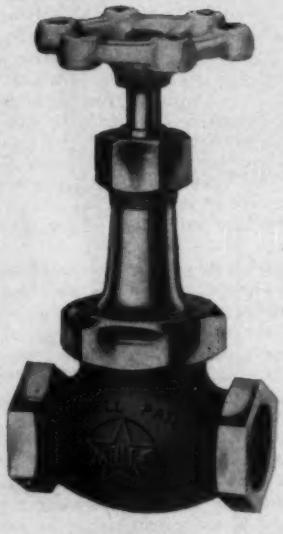

Fig. 1788 (Above)—A 200-pound Bronze Globe Valve, with screwed ends, Union bonnet, renewable seat and regrindable, renewable nickel-bronze semi-cone plug type disc. Sizes ¼" to 3".

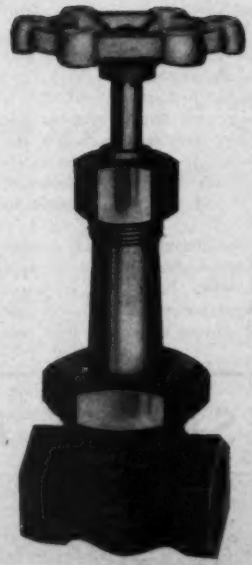

Fig. 375 (Right)—A 200-pound Bronze Gate Valve, with screwed ends, Union bonnet, inside screw rising stem and special, hard nickel-bronze disc. Sizes ¼" to 3".

If necessary, these valves can be easily and quickly repaired. Can be repacked under pressure when wide open.

THROUGH long and intensive training, thousands of young American pilots are daily learning the "unerring control" that is already making our Air Force a deadly menace to the enemies of our Country.

And through nearly five generations, the men of Powell have been in training to make the valves that are so important in the production of the planes themselves and of the gas and oil to "keep 'em flying." For in every plane are assembled the results of many and varied manufacturing and fabricating processes. In each of these processes, valve control — unerring control — is a vital necessity.

As a result of nearly a century of practical experience and scientific achievement, POWELL Valves are meeting every day the most exacting requirements of our stupendous program for Victory.

The Wm. Powell Co.
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POWELL VALVES

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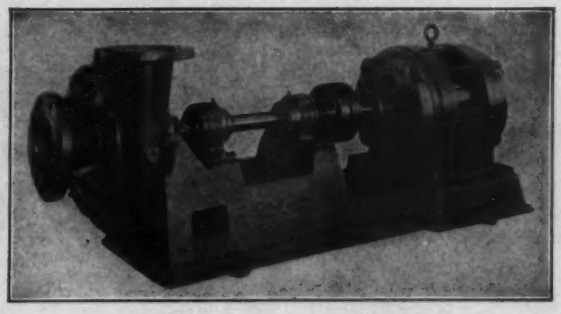

Why not let us—working with your own engineers—make a check-up. You'll incur no obligation—and the findings may surprise you. As specialists in pumping problems, with three-quarters-of-a-century of experience, we will gladly work with you thus—and may be able to point the way to substantial savings—either by means of new pumps, or by modifying your present equipment.

The cost of a PUMP is an investment in service. The cost of PUMPING is a continuing expense. A LAWRENCE CENTRIFUGAL built to meet your specific operating conditions will cost no more, but will yield you continuing returns in lower pumping costs. Whatever the material or duty, there's a LAWRENCE PUMP that will do the job at less cost. We'll be glad to discuss YOUR job with you.

LAWRENCE MACHINE AND PUMP CORPORATION

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CENTRIFUGAL PUMPS

Previous to the introduction of the carbonaceous zeolites, the only method known of removing sodium bicarbonate from water was distillation. With the carbonaceous zeolites operating on the hydrogen cycle, sodium bicarbonate may be removed together with calcium and magnesium bicarbonates. This process, therefore, has been of especial value in softening boiler feed waters for mills operating on waters containing sodium alkalinity.

A later development has been that of the anion exchangers or acid removers such as De-Acidite. This granular material is used in much the same manner as a zeolite, that is by simply percolating the water through a bed of it. It differs, of course, in that it removes acids instead of bases and in that it is regenerated with a solution of an alkali such as soda ash. The removal, also, is probably an absorption of the entire acid molecule rather than just the acid ion. Carbon dioxide has no effect on it and passes through unchanged.

The raw water first passes through a hydrogen zeolite unit which removes the bases and replaces them with hydrogen, the net effect of which is to convert the bicarbonates into carbon dioxide, the chlorides to hydrochloric acid and the sulphates to sulphuric acid.

It next passes through the De-Acidite unit which removes the hydrochloric acid and sulphuric acid. From this it passes through a Degasifier which removes the carbon dioxide and an effluent is thus furnished which is practically the same as a distilled water in composition. Operating costs vary according to the composition of the raw water but, in general, are from 5 per cent to 15 per cent of the cost of distillation.

Hide Glue for Tub Sizing

O. V. SIMONSON, B. CH.
Milligan & Higgins Corporation

Hide glue is made from the hide, connective tissue and sinews of cattle, sheep, goats, horses, deer, and other animals. These raw materials do not in themselves contain glue, but an organic substance known as collagen, and the function of the manufacturer is to treat this raw material so as to convert the collagen into glue, separate it from extraneous matter and then dry it and pack it.

When properly made, it is a natural for the growth of bacteria, so all glue manufacturers use a small amount of preservative to prevent the glue from picking up bacteria between the time it leaves the factory and the time it is ready to be used in your plant. Considering the weak solution of glue used by the paper sizing trade, and other materials, an additional preservative is called for, and what may be a good preservative for one man's glue may be poison to another man's glue. Often it will ruin the viscosity and has frequently caused a curdling effect. It is a good plan to consult with your glue manufacturer as to the proper type of preservative to add; it will not only save you disappointment, but some money.

Always soak glue in cold water for two hours. Longer soaking will allow bacteria to develop, especially in the summer months when the water temperature rises rapidly.

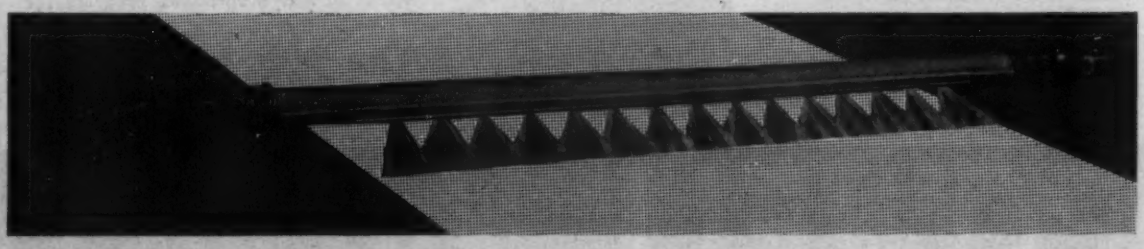
Some paper mills experience great difficulty in adding alum to their size solutions when the glue is hot. I suggest adding the alum to the cold water in which the glue is soaked.

After soaking gradually raise the temperature to 140 Fahr. until the glue is completely in solution. It should then be lowered to sizing temperature as soon as possible. Over-heating will break down viscosity and jelly strength.

The essential points to consider in the selection of proper sizing glue are:

(1) Fluidity of sizing solution
(2) Temperature of sizing solution

For SHOWER PIPES—Call Headquarters!!



BULLETIN 134 **SANDUSKY FOUNDRY & MACHINE CO.** Sandusky, Ohio

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For highest efficiency, most Radial bearings are loaded at *right angles* to the roller axis. Bearings loaded that way last longer, have greater resistance to shock and vibration.

But how about THRUST—the FORGOTTEN BEARINGS of Industry? Too frequently thrust loads are dumped onto the same bearing that carries the radial load—usually at acute angles that veer 15° to 40° from the perpendicular. No wonder the rollers tend to slide out from under the load. No wonder they wear against the radius of the race, building up high torque loads, setting up complicated internal stresses.

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Why not send us your drawings for our specialized analysis and the benefit of our bearing "know how?" We'll give you "engineered to the job" bearing recommendations. We'll help you engineer your bearing problems down to earth. There's no charge, of course.

STANDARD METRIC DIMENSIONS AND TOLERANCES FOR QUICK SUPPLY AND LOW COST

The available types and series of Rollway Solid Cylindrical Roller Bearings run into the hundreds—each engineered to standard metric dimensions and tolerances, and to specific uses. No extra tooling, no special machine set-ups are necessary to fill an order. You get faster service, easier replacements and lower cost.

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But it takes water to build tanks—water for the men who work in the plants—for those who produce the steel for those who operate and service them—and for millions of other people in the Service of Supply. Before plants could be built, armies trained and munitions made, there had to be an abundance of water. Upon the old, reliable and capable shoulders of the Layne Organization fell much of the task of producing that water. Layne swung into action and in record time, built deep well water systems by the hundreds, thus making possible unprecedented war and production programs.

Layne's reputation like that of the "General Grant" tanks, has been won on the field of action. Layne wells and pumps are doing an outstanding job—operating day and night, producing millions and millions of gallons of water for almost every phase of America's war effort. For late bulletins, wire or write LAYNE & BOWLER, INC., Memphis, Tenn.

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Layne-Western Company.....Kansas City, Mo.
Layne-Western Co. of Minn.....Minneapolis, Minn.
International Water Supply, Ltd...London, Ont.

(3) Concentration of sizing solution
(4) Type of paper to be sized

Specifications for a quality tub sizing glue are:

(1) Keeping quality—This is merely aging the glue solution without preservative and observing the appearance of bacteria. A good indication of the purity of a glue is thus obtained. This is most important for loft-dried and wet-packed papers.

(2) Appearance when dissolved—A clear, transparent solution isn't essential, but it should be free of extraneous material and sediment.

(3) *p*H—The *p*H should range between 6.0 and 6.6. If the *p*H is thus controlled no color fading will be encountered.

(4) Grease content—The free grease should be within a reasonable limit. I should say no more than 0.3 per cent, thus eliminating any danger of "eyes."

(5) Viscosity—The viscosity of the glue you select may have a wide range.

(6) Odor—Each manufacturer's glue has a characteristic odor, depending on the process and stock from which it is made. If the odor is sweet, you can depend on the glue. The keeping test has already determined the presence or absence of bacteria.

Abridgments have been prepared of a large number of the papers presented at the annual convention of **The American Pulp and Paper Mill Superintendents Association**, which met at Grand Rapids, Michigan, June 16-18, 1942. The first installment is published this month. Other installments will appear in succeeding issues.

More Steam Without More Boilers

GEORGE H. URBAN, Steam Plant Supt.
Marathon Paper Mills Company

The Rothschild Division of the Marathon Paper Mills Company has a sulphite mill and bleach plant with a daily capacity of 120 tons, using hemlock, spruce, and balsam wood. The paper mill has four paper machines, one board machine, two fourdriniers, and a Yankee machine, producing 170 tons of paper per day which is mainly used for food cartons and waxings. There are also various coating and laminating machines making paper for special food containers.

The electrical generating capacity includes a large back-pressure twin Corliss engine, two steam turbines, and a hydro plant. The hydro plant has always been the stumbling block in getting new high pressure boilers and topping or back-pressure turbines. During times of ample water in the river, there would be no use for the electrical energy produced by high pressure steam. Consequently, during those times, the installation would earn no money, but the fixed cost and overhead would go on. Hence we never felt economically justified in discarding the low pressure boilers and present engines and turbines.

For comparatively short periods when the river flow is low, or very high, the steam plant and transmission line supply the deficiency of electrical energy from the hydro plant. A system of water storage reservoirs, hydro plants, and stand-by steam plants operated by the public utility supply ample electrical energy at a reasonable cost.

The main boiler plant consists of five boilers from 20 to 28 years old. These are—four 390 hp. four-drum bent tube boilers, and one 871 hp. straight tube cross-drum boiler. In addition to these boilers there are six 33-year old Scotch Marine boilers used to burn wood refuse from the woodroom operations and hogged wood from nearby saw mills, when it is available. This old plant is also used as a standby in event of a breakdown of the water tube boilers.

The first limiting factor which prevented high rating was bad water boiling conditions in the boilers, resulting in wet, dirty steam. The bent tube boilers have the steam take-off on the center drum which creates a bad steaming condition. About 65 per cent of the steam produced was returned to the boilers as condensate. By closing up the condensate return system and adding more collection and return equipment, we were able to reduce the amount of raw water make-up. This resulted in a saving of heat, a saving in boiler feedwater treating chemicals, and put a greater percentage of pure water back into the boilers. The feedwater treatment is closely checked daily by testing the raw water, feedwater from each boiler, etc. The raw water used is river water and contains a high percentage of organic matter but only small amounts of hardness. Neither lime-soda nor Zeolite softeners will solve the problem. A closely controlled internal water treatment is used, and changes were made in the boiler plant to get satisfactory steaming conditions. Among the problems that had to be solved were wet, dirty steam, scale in boilers and preboiler equipment, oxygen and other entrained gas corrosion of preboiler equipment, and the protection of boiler metal from embrittlement.

A direct-contact, deaerating heater of ample size with additional storage capacity was installed with an automatic steam make-up valve which holds the heater temperature at 212 degrees at all times. This removes most of the oxygen and some of the other gases. Steam purifiers with rapid dumping traps which are able to handle large amounts of muddy water were installed on each boiler. These purifiers and traps reduce the amount of moisture in steam to less than one-half of one per cent. Internal baffles were also installed in the steam drum to help reduce the load on these traps and to prevent slugs of water from going up the steam nozzle. Feedwater regulators with differential pressure regulators were installed on each boiler to hold a safe water level with a minimum of fluctuations. This also helped reduce wet steaming conditions by

keeping only a minimum safe level in the boilers.

To take care of the additional steam load conditions, more efficient and larger capacity feedwater pumps were installed. In the case of the motor driven pumps, the same motors were able to drive the new pumps, which gave more capacity and pressure than the old pumps because of a more efficient design.

A continuous blowdown was installed with a heat exchanger which recovers a large percentage of the heat in the water blown down from the boilers. The amount of blowdown from each boiler is regulated by a valve which is controlled by the feedwater regulator. It blows down a predetermined percentage of the water entering the boiler. In this way the concentration of solids and soluble salts is kept constant with a minimum amount of water wasted. With intermittent blowdown, concentrations vary between periods and more water must be wasted to get the same results. The continuous blowdown gives us cleaner boilers, drier steam, saves water treating chemicals, and saves us from 2 to 2½ per cent of our coal. This is a large saving considering the small investment, negligible operating cost, low maintenance and no operating labor.

Originally the boilers were equipped with underfeed stokers of two different makes. With the underfeed stokers our average monthly rating was about 75 per cent in summer and 120 per cent during the winter, with a yearly average of 110 per cent. As our load increased, part of the underfeed stokers were removed and overfeed spreader stokers were installed. Now all our firing is done by overfeed stokers. The overfeed stokers we are using are capable of burning most coals of characteristics from hard coal screenings and coke breeze to high or low volatile, high or low ash fusion point coals. We also successfully burned reclaimed waste sulphite liquor on them, which has about 50 per cent moisture and about 4000 B.t.u. per pound, at a continuous rate of 95 lb. per sq. ft. per grate surface. The fuel is spread thinly and uniformly over the entire grate area which is level. The air is introduced uniformly over the entire tuyere area and distribution is not affected by fuel bed resistance. A turbulence is produced in the loose ash between the grates and the thin fuel bed and at the point of gas release, which is within a short distance of the fuel bed. A uniform heat release results over the entire grate area without the stratification which often is present in underfeed stoker operations.

The uniform heat release has a direct bearing on efficient operation due to more uniform heat absorption at the boiler surfaces. This lowers the flue gas temperature which in turn raises the efficiency. Blowholes cannot form in the fuel bed and therefore excess air introduction is held down. This results in higher and more uniform CO_2 in the flue gas. There is no necessity for barring the fires in order to close up holes or to break through coke crust formations as is necessary with same types of stokers, the frequency of which depends upon the type of fuel they are trying to burn. The reciprocating motion of coal feeder prevents the bridging of coal

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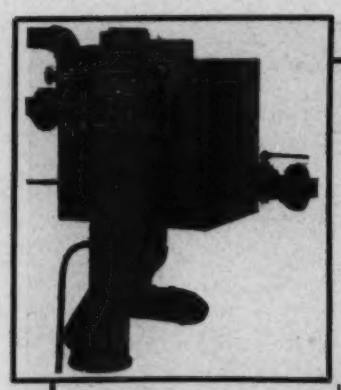

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TRIMBEY MACHINE WORKS
Glens Falls, N. Y.

in the hoppers when the coal is wet. This bridging troubled us badly with underfeed stokers. The main contribution to the success of the type of overfeed stoker we are using can be attributed to the novel tuyere design. Due to its angular air injection uniformly over the entire tuyere area combustion occurs closer to the tuyere surface. This angular air injection also creates a turbulence which compensates in part for the time element lacking in a low set boiler.

When the stoker equipment is properly operated there is never over a four minute fuel supply in the process of combustion at any time, and load swings varying from 50 to 250 per cent of rating can be handled over a period of a few minutes. There is at no time a fiercely burning bed of thick fuel to continue to make excess steam after the peak steam demand has passed.

The stoker has no moving parts within the furnace and all moving parts are accessible for inspection and lubrication while in service. The equipment on each boiler consists of three of more unit feeders, each unit being capable of being taken out of service if necessary, in event of a failure, while the remaining units continue to fire the boiler. The parts of the units are small and light in weight and are standardized and interchangeable.

The boilers were equipped with meters to record and indicate the amount of steam produced. They were also equipped with draft gages, recording pressure gages and thermometers. To further guide the operators, steam flow-air flow meters were installed. They record the steam and relative air flow and co-ordinate them on the same chart.

The steam demands to the pulp mill bleach plant, etc., fluctuate widely, often varying at a rate of 100,000 lb. per hour within a few minutes. The load changes are beyond the control of the steam plant operators. To supply this swinging demand we installed a standard metering type combustion control, with revisions of our own. With the stoker and auxiliaries capable of following the steam variation quickly, the combustion control keeps the steam pressure constant within a narrow range. The control operates simultaneously the forced and induced draft dampers on the boilers and economizers, changes the amount of fuel fed by the stoker, and keeps the desired draft in the furnace. It also changes the speed of the fan turbines and engines, and distributes the load between the boilers so that each unit carries its share. The fuel and air ratio is correctly maintained over a wide range of steam demands by the use of controllers which follow a predetermined curve to supply the proper amount of air regardless of the position of the controlling dampers.

The bent tube boilers, as installed, had the standard vertical baffles. These were replaced by cross flow baffles which reduce the possibility of short-circuiting, promote more efficient transfer of heat and put more heating surface in the first pass of the boiler. These baffles allow the soot blowers to do better work and reduce the number of places where soot and fly ash can remain. There is less heat reflected down on the grates which helps to reduce clinkering. The baffles are made of reinforced fireproof plastic which results in a thin, gas-tight and fireproof wall of great strength.

The economizers originally contained smooth cast-iron tubes and headers. The heating surface was increased by replacing the cast-iron elements with extended surface steel elements. In this way much more economizer heating surface was put in the same casing.

The induced draft fans were driven by steam engines. In some cases the power of the engines was increased by changing the valve design. Where the engines were too small they were replaced by motors. In this way the available induced draft was increased to take care of additional gases and also to compensate for the resistance of the fly-ash collectors.

To collect fly-ash we installed novel collectors inside of our chimneys, and resting on the top of the brick linings inside.

The arrestor consists of a double walled metal cylinder with a stationary helicoid near the bottom which gives the stack gases a directional change. Cinders and ash are deflected by the helicoids and are forced to travel around the inner jacket, ultimately passing through the collector into the annular space between the double wall where they are caught in a downward whirling draft and swept into gravity conveyor pipes.

There are no moving parts to this collector and no power is required. The design is such that there is little change in the lineal speed of the stack gases; accordingly loss due to acceleration and deceleration are eliminated and are limited to those caused by the friction due to greater travel in following the helical path instead of a straight one.

The cost of these collectors was low and they take up no space in the boiler room. They have proved very satisfactory and we have had no fly-ash complaints. The fly-ash collected in these devices, and also that collected in the last passes of the boilers and economizers, is returned to the furnace with high pressure air where it is reburned. This represents a noticeable heat recovery. Contrary to theories advanced by some engineers, we have found that only a small percentage of this returned material passes out of the furnace for a second time as most of it falls on the grate where it burns.

Our boilers are set in battery and the boiler installation and settings are such that it is impractical to install water-cooled walls. To reduce fire brick maintenance and outage due to refractory failure we installed sectionally supported air-cooled and insulated walls using intermeshed tile for battery walls, bridge walls, arches and other parts of the furnace which get the most severe service.

Thoroughly insulating all steam and hot water lines, insulating tops and settings of boilers, and stopping all air leaks in settings paid dividends in fuel savings.

We realized there was considerable leakage in the conventional type of breeching dampers due to twisting, warping and settling of the breechings. This leakage represented a loss in heat and reduced the chimney and induced draft fan drafts. The loss through our economizer by-pass damp-

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ers was particularly bad; when the draft in the breechings exceeded the draft in the by-pass flue to the chimney the chilled gas which had already passed through the economizer was recirculated through the economizer again. On the other hand, when the stack draft exceeded the breeching draft, hot gases went around the economizer to the chimney. This alien gas reduced the temperature and increased the volume of the gas between the boiler and economizer resulting in lowered heat absorption, increased draft loss, excess load on the induced draft fan and a reduction of draft in the flue. These conditions lowered efficiency and capacity. We replaced these dampers with a type of roller curtain damper which prevents this undesirable leakage. The curtain dampers gave us about 200 hp. additional capacity and 50 Fahr. increase in temperature of the gases entering the economizer due to elimination of pollution by alien gases.

Another way we saved fuel was by reducing the steam used in the boiler house itself. For instance, we installed a more efficient steam jet ash conveyor system which moved ash much quicker, used much less steam per hour and reduced maintenance on the conveyor system to almost nothing. This ash system incidentally has a dustless unloader attached to its storage tank, which keeps ashes from being scattered over the yards and buildings. Other savings were made by using unit air heaters in the forced draft fan ducts to reclaim excess low pressure steam at times when it cannot be utilized entirely by the feedwater heater; by reducing the steam used for soot-blowing by always blowing the minimum amount necessary to keep the tubes clean.

Efficiency can be increased and cost reduced by the proper selection of coal. To take advantage of the many types and sizes of coal available we rebuilt our coal crusher so it would crush to smaller maximum sizes. In order to burn degradations, excessive fines and by-product fuels we installed coal mixing equipment so that we can thoroughly mix different types of coal.

We waterproof our coal storage piles by spraying an emulsion on them. This keeps the rain, ice, and snow out and prevents freezing in winter. In this way the coal is kept dry and there is less loss in the furnace due to excess moisture. The coating is air-tight and helps to prevent fires, and reduces losses while the coal is stored.

Without rebuilding the entire plant we know of no practical way of increasing the ratings farther.

Then we investigated and installed superchargers operated by electric eye robots and found we could substantially increase our present steam production and efficiency by their use. We installed them on all our furnaces in the Rothschild and Menasha Divisions, and the results proved most gratifying, satisfactory, and profitable.

The superchargers are controlled by electric eye robots and introduce high pressure air to the furnace through a series of manifolds and nozzles. Each installation usually requires a different method, point of application, size of manifolds and nozzles to approach perfect results. Unfortunately there can be no standard design for all furnaces which would make engineering and installation simple.

Formerly we used steam jets over the fuel bed to try to stop smoking but they only white-washed the smoke and put in a small amount of over-fire air. The steam from the jets whirled the ashes around the furnace with little effect except to scour out the refractories, producing hot spots and reducing zones, and building up slag in other places. Steam jets of any kind are unnecessary when superchargers are used.

Smoke can easily be eliminated completely or controlled at any desired density by the use of superchargers. The loss due to dense smoke seldom exceeds one per cent of the carbon in the coal. However, the loss due to accompanying combustible gases may be in amounts of 3 to 10 per cent hydrocarbons, etc., remaining unburned because of the lack of the proper mixture of air and gases at the proper temperature and at the right time and place. Low furnace temperatures can cause smoke and on the other extreme, high temperatures produce smoke and combustibles also.

Unlike other systems of over-fire air which try to create a turbulence in the furnace by whirling the gases in circles, this system creates turbulence by mixing the air with the products of combustion by the use of multiple air streams flowing parallel with the fuel and flame travel. In this way the supercharger produces almost instantaneously, complete combustion, not

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only of carbon monoxide, but other hydrocarbons, etc., which escape from most furnaces without burning completely. These unburned carbons which are usually not detected by the ordinary boiler room instrument, ordinarily escape from the furnace in chemical combination which do not give up the maximum heat available. With superchargers, smoke and combustibles are completely burned and all stratification of gases is removed before they reach the boiler.

Before the supercharger installation, our peak load ratings were about 240 per cent of normal. The highest average rating we were able to obtain for a month's period was 175 per cent. With the superchargers our peak load ratings are about 290 per cent and the highest average rating for a month's period was 205 per cent with higher available capacity if it had been needed.

Without the superchargers our overall boiler furnace and economizer efficiencies were 81.5 per cent when average ratings did not exceed 155 per cent. At 175 per cent of average rating the efficiency was 79.0 per cent, or a drop of 1½ per cent. With the superchargers the average monthly efficiencies are 84.0 per cent when average monthly ratings do not exceed 175 per cent. From 175 to 205 per cent of rating, the monthly efficiencies now average 82.4 per cent.

The superchargers save about 3 per cent of our fuel and reduce clinkering on grates and furnace walls. The range of efficient operation is considerably broader with supercharger. It is less difficult for the operators to make firing equipment produce, and keep producing its maximum efficiency. There is much less combustible in the ash and the burning of lower ash fusion point coals than before is possible with less operating difficulties. The burning rate of fuel per sq. ft. of grate area was considerably increased. Fly-ash was reduced about 50 per cent and the combustible content of the fly-ash was reduced This reduced the load on the fly-ash arrestors. Slagging of boiler tubes was reduced and less soot blowing is needed to keep boiler surfaces clean. We were satisfied that the over-feed stokers alone gave us a fast steam pickup, but with over-feed stokers and superchargers together we get a steam pickup that approaches that which is possible with powdered fuel.

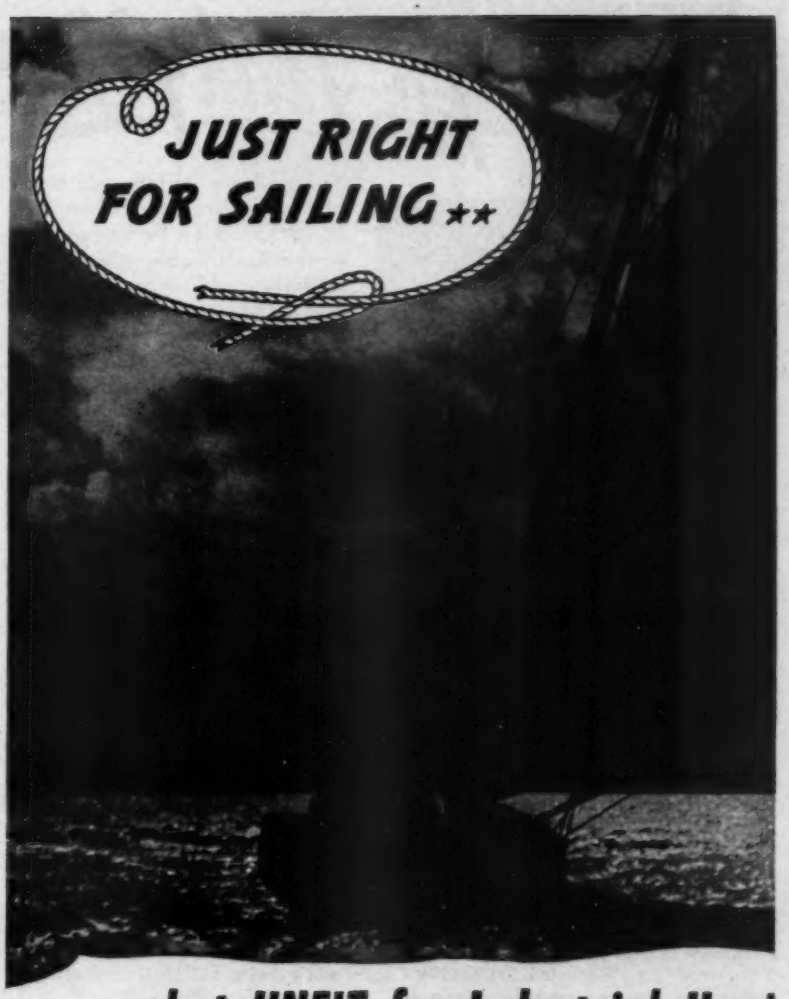
Use and Care of Paper Mill Felts

A. PERLICK
Kalamazoo Vegetable Parchment Company

The first step in the direction of felt economy is the selection of the proper felt.

In the selection of a felt, the major problems that confront the superintendent are drainage and finish. Where a good finish is required, free from felt marks, a closed felt must be used.

Specialty mills and those making a variety of papers at different speeds find it necessary to compromise on a felt that will work satisfactorily for all the conditions. Sometimes this is quite a problem, making it necessary to group grades on certain machines, and arranging machine schedules



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War-Time demands naturally control production schedules, making it advisable to study future equipment requirements now.

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accordingly. It often becomes necessary to change felts to make certain grades of paper —such as changing from a comparatively free stock to a slow stock, where felt marks interfere with quality.

In recent years the trend has been to lighter felts, due to demands for increased production and efficiency. Switching to a lighter felt has the advantage of increased drying efficiency and less cockling, and in some cases the elimination of felt conditioners which are common to mills using heavy felts.

When putting on a new felt, care should be taken to make sure that all the machine parts that the felt might touch is wiped clean of grease and oil, also that the machine help does not handle the felt with greasy hands. If grease should get onto the felt it must be removed at once with carbon tetrachloride or some similar solvent.

In most cases, it is unnecessary to wash the new felt before using. It has become general practice simply to wet down the felt to shrink it on. However, there is some advantage in washing the new felt to be used on high speed machines, particularly those making light weights, because there are still some natural oils remaining in the wool which interfere with drainage and cause sticking.

Washing an old felt requires some special knowledge of the local conditions in order to decide on the type of cleaning agent to apply. Neutral soaps are most generally used; the soap solution is made up to the desired strength and applied at around 105 Fahr.

The mechanics of washing a felt are nearly the same in all mills, first remove the weights and levers, apply the soap solution and rope to the center to obtain the proper squeezing action. Washing is continued as long as necessary. Keep felt roped in center while rinsing and apply as much water as possible; rinse thoroughly.

After washing an old felt or wetting down a new felt, do not run longer than necessary without weights and levers in place to avoid getting seams out of line and closing warp.

There are a good many things that could be mentioned to obtain maximum life out of a felt. Suction presses should be either rubber covered or have a soft rubber top roll. Straight presses should be equipped with a soft rubber bottom roll. Another source of possibility for extending life of a felt that might be given some consideration is the installation of a suction roll, in place of suction boxes ahead of the first press. This eliminates the friction of the felt passing over the box. Installations of suction rolls have been known to double the life of a felt. In order to get the best results from the suction roll, it should be driven and equipped with a separate suction pump.

Those mills using suction boxes on the felts must avoid high vacuum because any increased vacuum puts that much more strain on the felt and increases the friction —thereby reducing the life. A 4-inch vacuum is recommended.

The cylinders of most cylinder machines are now being driven, permitting the use of lighter felts. However, most cylinder machines use a heavier felt than that used on the average fourdrinier machine.

Harper machine pick-up felts are generally heavier for the same reason, requiring a stronger felt to carry the load.

Board machines, where finish is important, as it is in most cases, require a fairly fine felt, heavier than the average fourdrinier machine.

Greaseproof, Glassine, etc., are made on fairly closed, fine-weave felts.

All-Out Maintenance and Substitution Program

P. S. SINCLAIR, President
The Sinclair Company

I have read many excellent papers in the past, and especially in recent months, about getting the last dollar's worth of value out of a given article. These papers have stressed the value of alignment, supervision, and many other good points. I have read nothing, however, that deals with the importance of the man on the firing line in the paper mills, emphasizing the point that he perhaps plays the most important role of all in the matter of conserving the critical metals and machinery, or other equipment in the pulp or paper mills. Some will say, and with plenty of authority to back it up, that good supervision can take care of this important item in the manufacturing of pulp and paper. The men who keep it on the reel, or the boys in the mill, in my opinion, can make or break a program of this kind.

I believe every superintendent and foreman who is sold on the idea should do his utmost in making sure that the man in the mill understands, as well as the man in the front office, that we have already entered a period where it is really a matter of survival, and that every idea of conservation, no matter where it comes from, should be given full consideration. Even though it is not used, the man making the suggestion should be encouraged to make other suggestions. He also should have available at his work bench all the material published that will aid him in using good judgment in every repair he makes. This material should be in every-day English, the elimination of all technical terms is desirable, and he should know all the vital elements needed for war, which will no longer be available in a few months.

In our business of manufacturing fourdrinier wires and dandy rolls, as well as servicing cylinder machines, we know the importance of co-operation of the man who throws the lever. Many a fourdrinier wire and cylinder face has been ruined through lack of information as to what happened when the wrong method was used. I think we who *classify* ourselves as managers, superintendents, and foremen are prone to expect our men to know all the answers. Of course, they and we, also, have a great deal to learn, and those of us who, through good fortune or hard knocks have experience and knowledge of the pitfalls concerning our particular field, should resolve that this knowledge should be made available in a new way for most of us. I mean by this that we must become patient teachers and watchdogs in our respective mills for the duration, at least.

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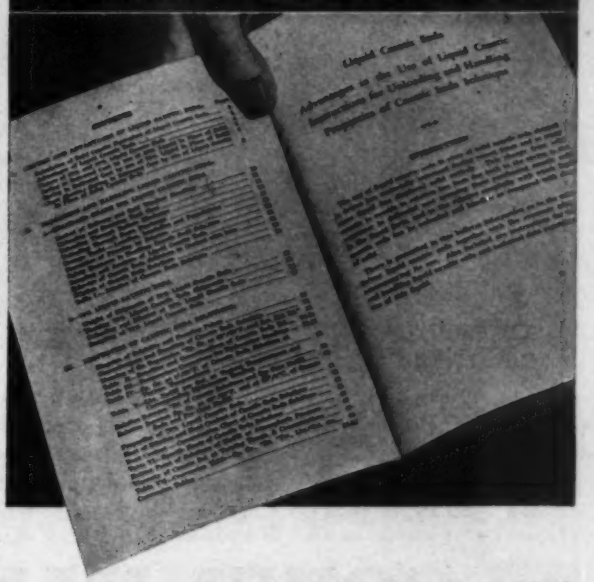

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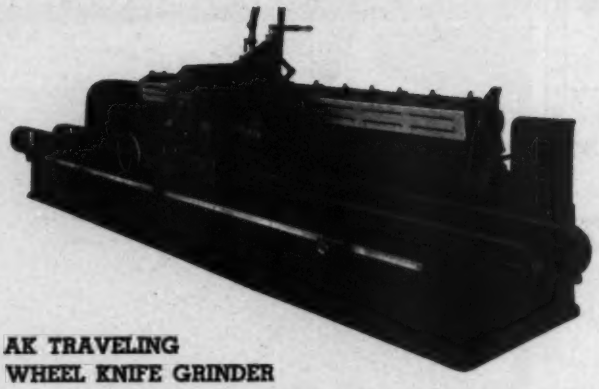

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BIG RAPIDS, MICH. PORTLAND, ORE.

Finally, let me urge you to ask your men to take a little more time when stringing a fourdrinier, or placing a mold in a vat; to use more water when cleaning; go easy with the acid and wire brush; and above all, treat your wire, dandy roll, or cylinder mould as if it were "The Last of the Mohicans."

pH Control System on Cylinder Board Machines

GLEN SUTTON, Superintendent
Sutherland Paper Company

I will try to make this paper show the advantages between a very low and a satisfactory higher *p*H for the sheet desired and will try to give you a few definitions and list a few advantages that we have derived from controlling *p*H, first naming them and then covering each one separately later.

Advantages to be gained:

1) Better uniformity of sheet
2) Better printing surfaces on paperboard
3) Better finish
4) Better folding sheets
5) Permanency of sheet
6) Retention

As we all know, especially those using some reworked stocks, there is no quick way of telling the nature of the stock before using it. This is also true of our virgin pulps. These factors tend to create a large variation in finished board. Therefore, by controlling *p*H, you have a better advantage of overcoming the above mentioned variations. We have also found a very decided advantage in controlling color and brightness with *p*H control.

We have found that we get a better printing surface as it is not necessary to run as low a *p*H on the majority of sheets. A sheet with a slightly higher *p*H does not seem to be as hard on printing plates and I do not believe that you have to use as much pressure on printing presses to get a satisfactory printing job. Also, in a majority of cases one can control the curl of paperboard more readily with a higher *p*H, which in turn would cause less trouble on the automatic feeders by having a sheet that will lay more flat.

Well-controlled *p*H, I firmly believe, makes it possible to get a better finish or printing surface due to being able to run your *p*H slightly higher.

If you can run your *p*H higher and get a satisfactory printing surface it is bound to help the folding quality due to your sheet not being so hard. I also believe the fold will stand longer, for we all know that a sheet may have a good fold when manufactured, but after standing awhile will have a tendency to get slightly brittle.

We have made several experiments on the permanency of board with a low *p*H and a high *p*H on different occasions and find that the hit and miss method will definitely brittle and discolor considerably faster than a sheet run at a proper *p*H.

I have read many articles which have been written regarding retention, but from my personal experience I cannot agree 100 per cent with most of them. The only advantage that I have seen that has led me to believe that the retention might be better is that by adding some of the alum closer to the machine on any white-lined sheet they seem to have a little better color. As far as fillers that might be used, we have had no tests made in order to compare the ash of an uncontrolled and a controlled sheet. Also, I have not been able to notice any difference in felts or cylinders filling up, which, if the retention is greater, should show a noticeable difference in this respect.

There may be more than one automatic *p*H control system on the market but we have recently installed the Automatic Micromax *p*H Control system manufactured by Leeds & Northrup Company, which performs three functions—measures *p*H continuously, indicates and records it, and controls addition of alum—all of which center in a thoroughly standardized Micromax recording controller.

The measuring circuit of the Micromax instrument connects through electrical conduit to a pair of electrodes so mounted as to dip into a continuously flowing sample of stock from the mixing box or white water from fan pump.

Both a continuous indication and continuous record of *p*H are provided. A prominent pointer aids in efficient operation by showing immediate *p*H condition.

The equipment which we have installed consists of four parts—Electrode Assembly, Micromax Controller, Relay, and Motor-Driven Valve. We have tried this unit at various places between the jordans and machine vat and found in our particular instance, that adding the alum between the stock distributing box and the screen has

worked out best. We take our sample of white water directly from our fan pump. I have heard of other installations being connected differently than our set-up and have been told that they worked very satisfactorily.

We have also found that we get better results by adding part of our alum at this point and the balance in the beater. We do not seem to get as bad a foaming condition at our screens and vats as we did when we put it all in at the above point.

Up to this time we have no definite figures with regard to costs, but my estimation would be that we are going to show approximately 10 per cent reduction in alum costs.

Conservation by Electroplating

D. H. BISSELL
Chromium Corporation of America

In the maintenance of equipment of pulp and paper mills, the problem of corrosion necessarily demands particular attention. Basically, any metal part can be prepared to resist corrosion in two ways: by alloying it throughout with some corrosion-resistant metal, or by suitable surface treatment. The great progress made in the development of alloys and their value to industry because of their non-corrosive and other properties needs no comment. However, in our present emergency the sometimes inordinately large quantities of strategic metals required for their manufacture does or should limit their use to equipment essential to the prosecution of the war, in which event there is little or no surplus available for private and less essential industry. On the contrary—and despite rather severe restrictions in the use of certain metals—it is still possible to provide protective surface treatment by electroplating in order to retard, if not entirely prevent, the ravages of corrosion.

The second ever-present factor of industrial operation is the normal wear of machinery and equipment. Corrosion makes its contribution here also, but eventually all moving parts wear to the point where they must either be repaired or replaced. In this field certain hardening processes have provided advantages and reduced maintenance costs, and here also industrial chromium plating has served a useful purpose, especially in the pulp and paper industry. The extreme hardness of chromium, which is nine-tenths as hard as the diamond itself, has been effectively utilized through the medium of electroplating not only to provide longer life for equipment, but also to maintain new-equipment performance, retain close tolerances and provide hard and smooth surfaces, which are literally reflected in the appearance of the product itself.

One of the most successful applications of industrial chromium plating in the paper industry is on screen plates. Ordinary bronze flat or curved screen plates had for many years been standard in this operation, with no substantial improvement in their conventional design. After only a few weeks' operation, worn, rough, and irregular slots were more or less accepted as a matter of course. Production losses up

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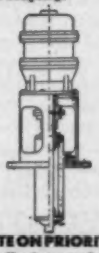

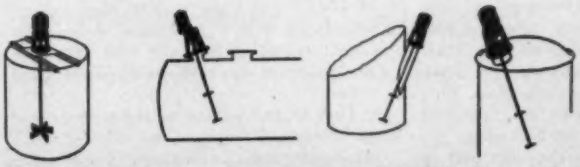

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to 40 per cent of maximum screening capacity were sometimes reported within no more than a single week's operation.

With the advent of chromium plating and its early application to screen plates, progressive improvements were accelerated through the co-operation of screen plate manufacturers who improved their own operations to meet the higher base metal and finish requirements. More pronounced smoothness of finished slots became necessary, and size tolerances in the slots were reduced to new standards of precision. The importance of proper screening and its more consistent control received increased recognition. These and other new developments were readily accepted, and in a comparatively short time have now become recognized as standard practice, resulting in improved screening efficiency, finer slots, cleaner paper, greater screen capacity, longer life, and lower operating costs. The difficulty of adequately chromium plating the inside of finely-sawed slots where adequate protection is most essential developed new methods of cutting these slots, such as those utilized in the open-back screen plate—widening the back slots, permitting easier release of the stock and reducing the possibility of clogging. Aside from the adoption of chromium-plated screen plates there have been other improvements in the design of conventional unplated plates, and to some extent stainless steel has been utilized with some success.

These developments are directly related to the subject of conservation, for they have materially prolonged the useful life of the average screen plate. One mill which has used hundreds of plated screen plates over a period of years has obtained an average of four times the normal plate life. Another reports imperceptible wear after fourteen months of service. After eight months of use in another mill, chromium-plated plates were found to be in perfect condition, but the slots of unplated bronze screens installed at the same time were roughened and worn as much as .002 inch during the same period. Elsewhere, unplated plates with 32-cut slots usually wore from .001 inch to .0015 inch within three months' time, depending upon the rate of operation, but chromium-plated plates under the same conditions were kept in service for over six months with no sign of wear. It has been possible to decrease slot sizes advantageously without loss of production, as in the case of a board mill where chromium plating permitted the use of 24-cut instead of 32-cut slots without production loss in comparison with a detrimental decrease in output caused by no more than .002 inch slot reduction due to the wear of unplated plates.

Due to the present emergency, the use of bronze and copper is seriously restricted, which affects the procurement of new screen plates. This brings to the fore the question of salvaging old plates by having them reclosed and recut. Although chromium plating of recut plates has not heretofore been generally recommended, as an emergency measure it may be necessary to utilize this method until such time as new plates can be released.

The reclamation of press rolls offers another possibility of conservation or substitution. The advancement of plating technique has made it possible to build up to a limited extent, worn, porous, or corroded rolls, grind accurately to the desired size, and chromium plate to obtain a perfect surface from which all imperfections have been removed. This frequently is less expensive than the application of a new shell, even though the material for it might be obtainable. The long-wearing characteristics of chromium-plated rolls preserve their original precision, simplify mechanical adjustments, and provide that longer life which is of especial importance under the current conditions.

Numerous other rolls used in the paper industry have for years been chromium-plated with marked success. These range in size up to drums 12 feet in diameter by 6 feet face length, weighing approximately 15 tons.

There is substantial economy in restoring worn parts such as small tools, gauges and dies by industrial chromium plating, as well as a material saving in the consumption of strategic metals. This contributes to the conservation program through the medium of salvaging tools and small parts, reducing corrosion of such pieces, protecting their essential precision, and increasing the output of metal-working tools.

It must be remembered that electroplating has its limitations and is by no means a universal remedy. Other than those standard applications, each is virtually a separate engineering problem and requires exhaustive study as to base metal characteristics, operating conditions, etc.

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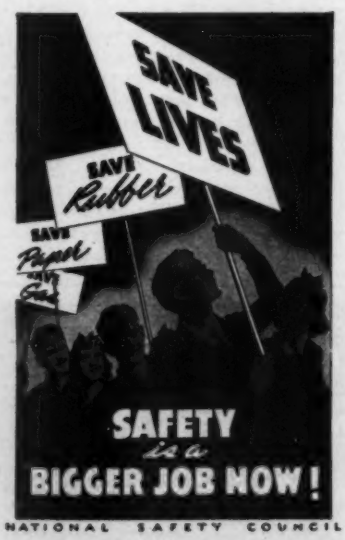

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This is the eighth installment of abridgments of papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry,** held in New York City, February 16-19, 1942. Previous installments have appeared consecutively in this section of each issue since March, and will be continued until completed.

Cupriethylenediamine as a Solvent for Cellulose Fractionation

F. L. STRAUS[1] and R. M. LEVY[2]

The direct fractionation method as given herein should help to overcome the difficulties encountered in preparing suitable fractions of cellulose for various synthetic purposes and provide a simple analytical method.

Before proceeding with the results of fractionation experiments, a few fundamental characteristics of cupriamine solutions of cellulose have to be considered.

Cuprammonium and cupriethylenediamine solutions are much better solvents for cellulose than the strong alkalies. However, these solutions contain a strong base, assumed to be tetrammine cupric hydroxide, and their action on cellulose could be ascribed to this strong basic character if it were not for the fact that the dissolution of cellulose in these solutions suggest a mechanism that is fundamentally different from that of other strong bases.

An exact formulation of the equilibrium relationships of cuprammonium solutions, in the presence of cellulose, involves many difficulties, whereas the substitution of ethylenediamine for ammonia simplifies the problem considerably.

If an excess of ethylenediamine is added to the cellulose—cupriamine solution, the electrical conductivity of the solution increases very rapidly even though ethylenediamine itself is a weak base with a low conductivity.

The large increase in the conductivity of the solution when ethylenediamine is added is due to the formation of more highly ionized components.

A satisfactory explanation of the above can be based on a theory formulated by Jolley (Jolley, L. T., *J. Textile Inst.*, 30:1200-1204, 1938), which considers the cupriethylenediamine complex to be represented by the following equilibrium:

$$[CuEn_2](OH)_2 \rightleftarrows [CuEn(OH)_2] + En$$

The evidence presented seems to confirm his assumptions.

The precipitation of dissolved cellulose, as such, by the addition of sulphuric acid commences when the free base $CuEn_2(OH)_2$ has been converted to the sulphate $CuEn_2SO_4$, and is complete when the part bound in the complex has also been converted to the sulphate.

High polymeric substances, as is generally acknowledged, can be fractionated by the method of "fractionated solution" or "fractionated precipitation" as long as physical solubility is involved exclusively. This assumption becomes less self-evident when the symptoms undergo formation and decomposition of definite salts or complexes, as is the case with solutions of cellulose in sodium hydroxide, Triton F, and the cupriamine bases. Therefore, it is necessary to prove that the partial precipitation of cellulose, as outlined previously, gives a true molecular fractionation. The experiments did, however, confirm this to be the case: cellulose of high viscosity is precipitated first, and the viscosity of this cellulose decreases with continued precipitation. We are obliged to conclude that the stability of the cellulose complex, in the presence of sulphuric acid, varies with the chain length of the cellulose molecules.

Solutions of cellulose in 0.5M cupriethylenediamine were prepared according to the directions given in a previous paper, excepting that the cellulose was dissolved in the presence of an 80 per cent excess of solid cupric hydroxide. The solid was filtered off at the completion of the dissolving period. The initial concentration of all the cellulose solutions used was held at 1 per cent, since the resolving power was comparatively high at this concentration.

The fractionation experiments were started with 100 cc. of a solution containing one gram of cellulose. To precipitate the cellulose, 8N sulphuric acid was added by means of a buret graduated in 0.01 cc. units, and the solution was continuously stirred during the acid addition, the temperature being kept at 25 C. Approximately 13 cc. of acid were required to precipitate the first fraction, and 3-4 cc. for all subsequent fractions. The mixture can then be centrifuged and the clear portion drawn off. The precipitated fraction is washed with distilled water in the centrifuge tube, and finally dried in a

(1) Director of research (deceased); (2) chief research chemist, Ecusta Paper Corporation.

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vacuum dessicator over sulphuric acid. An additional amount of sulphuric acid can then be added to obtain the second fraction which is treated in the same manner. This procedure was continued until the original cellulose had been divided into about eight fractions, and no further precipitation occurred by the addition of acid. The dried cellulose fractions were redissolved in 0.5M cupriethylenediamine and their viscosity determined. Following the viscosity determination, an aliquot of each solution was taken, and the cellulose was completely precipitated by the addition of sulphuric acid. The precipitated cellulose was washed in the centrifuge tube, and the amount of cellulose present was determined by a modified oxidation procedure. This method gave results which differed by about 0.2 per cent on duplicate runs, and was run as follows:

The cellulose is first treated with 75 cc. of 75 per cent sulphuric acid at 25 C. for approximately 20 minutes. Five to 25 cc. of potassium dichromate (35 grams per liter), depending on the amount of cellulose present, are then added, and the mixture is heated to 180 C. for 10 minutes. The mixture is cooled to 70 C. and 50 cc. of distilled water added. The excess dichromate present is determined by an oxidation-reduction titration with 0.01N ferrous ammonium sulphate using a Leeds and Northrup potentiometer with calomel and platinum electrodes.

By knowing the amount of dichromate required for the oxidation, the quantity of cellulose present in the sample may be calculated, since 1 cc. of the potassium dichromate solution (35 grams per liter) will oxidize 5.20 mg. of cellulose. This value was determined by oxidizing samples (average of 8) of known cellulose content. Thus, the amount of cellulose in each fraction can be determined without resorting to a direct weighing procedure which involves a number of experimental difficulties. From the determined weights of the cellulose fractions and the measured viscosity values, the molecular weight and degree of polymerization can be calculated.

The method of Staudinger (Staudinger, H., "Die Hochmolegularen Organischen Verbindungen," Berlin, Julius Spring, 1932), relating viscosity and molecular weight of high polymeric substances, has received considerable attention because of its simplicity. And although a number of investigators have cast some doubt on Staudinger's theories, the bulk of evidence presented seems to favor his conclusions.

Kraemer (Kraemer, E. O., *Ind. Eng. Chem.* 30:1200-1204, 1938) has shown from ultracentrifuge experiments that the intrinsic viscosity [η] is related to the degree of polymerization, and he gives these relationships for cellulose in cuprammonium solutions as follows:

$$\frac{\text{D.P.}}{[\eta]} = 260$$

and

$$\text{D.P.} \times 162 = \text{Molecular Weight}$$

where D.P. = degree of polymerization

The effects of various solvents on the intrinsic viscosity of cellulose derivatives has been shown by Kraemer to give con-

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stant values, indicating definitely that these solvents disperse the derivatives to the single molecule. Since cuprammonium and cupriethylenediamine solutions are known to disperse cellulose to the same degree, the value of 260 [η] can be used for the determination of the degree of polymerization of the dissolved cellulose, the value of [η] being determined as outlined above.

More work is needed to obtain a sufficiently accurate method of estimating molecular weights, independent of viscosity or osmotic pressure measurements. The ultracentrifuge method given by Kraemer seems to show greatest promise in this regard.

Relation of Lignin Content To the Strength of Paper and Paperboards

IV. Microchemical Aspects of the Relation between Lignin Content and the Strength of Fiberboards[1]

W. F. FOWLER, JR.[2] and W. M. HARLOW[3]

Since the behavior of wood fibers when pressed to form boards is probably dependent not only upon the amounts of certain constituents but also their location in various portions of the cell wall, it was thought that a microscopical study should help to better interpret the purely quantitative data obtained by Holmberg and Jahn (Parts II & III of this series). Samples of their materials including pulps prepared by different processes, and the kraft fiberboards, were treated microchemically and the latter also microdissected.

Sectioning in water caused distortion due to swelling; it was therefore necessary to cut microtome sections from fiberboards immersed in benzene for several hours prior to sectioning. Using a heavy knife at a steep (8 degrees) vertical angle, it was possible to prepare sections 12μ in thickness from this relatively refractory material. The knife was lubricated with benzene, and the sections stored in this liquid until needed. For testing, the sections were brought down into water through several intermediate changes of ethanol and water.

On each of the pulps sampled, the following examinations or tests were made microscopically:

(1) Appearance in normal light.

(2) Appearance between crossed Nicols of the polarizing microscope.

(3) Visual effect of 72 per cent sulphuric acid.

(4) Visual effect of Schweizer's reagent (cuprammonium hydroxide solution).

(5) Visual effect of the modified Maule reaction.

(6) Visual effect of the modified Tollen's reagent.

(7) Visual effect of phloroglucinol in 15 per cent HCl.

In the boards, fibers were chosen for study, which crossed more or less at right angles; this was to be certain that the fibers observed had not perchance developed next to each other in the original wood which might in certain cases be incompletely pulped. Microdissection was carried out on sections (immersed in benzene) by means of fine piano wire hooks fitted to the micromanipulator. Two adjacent cells were pulled apart in this manner, until they separated, while observations were made of the type of rupture which occurred.

The results of the microdissection experiments indicated that, in general, as lignin content decreased, the cohesion (and/or adhesion) of the fibers of the board increased. At high lignin content the fibers merely pulled apart with the secondary walls intact which showed that the cohesive forces between the particles in the secondary wall was greater than the cohesive force between adjacent fibers. This condition may be in part explained by the presence of intercellular lignin about the fibers, which prevented many primary wall surfaces from coming into contact with one another. As the intercellular lignin was removed, the primary walls made increasingly better contact. Finally a point was reached where the cohesive force between primary walls was greater than that between particles in the secondary walls and, therefore, rupture occurred here. Beyond this point, as the material was further delignified, the boards made from it were weaker, presumably because of partial degradation of the cellulose itself.

(1) Portion of thesis for partially satisfying requirements for degree of Master of Science; (2) Formerly Graduate Assistant, New York State College of Forestry, Syracuse, New York; (3) Assistant Professor of Wood Technology, New York State College of Forestry, Syracuse, New York.

Application of the Electron Microscope to Problems of the Pulp, Paper and Paperboard Industry

GEORGE R. SEARS and EVELYN A. KREGEL
The Institute of Paper Chemistry

The R. C. A. electron microscope is upside down compared to the optical microscope in so far as the electron beam travels from top to bottom instead of upward as does light in the ordinary microscope. The "lenses" are symmetrically wound coils through which electric currents are passed to produce the required magnetic fields. The rapidly moving electrons are deflected as they move through the magnetic fields of these coils and their associated pole pieces in a manner which may be considered analogous to that in which rays of light are bent as they pass through a lens. These magnetic lenses have a convenient property in that their focal lengths depend on the current which is passed through them so that the focus and magnification are changed, not by moving or changing lenses, but by the simple operation of turning a rheostat which controls the current through the appropriate coil.

The specimen is mounted on a ⅛-inch disk of 200-mesh metal screen and is placed just above the pole piece of the objective. The disk is so mounted that it may be moved about as the specimen is examined. Satisfactory exposures can ordinarily be made in about ten seconds. From three to eighteen exposures may be made on a

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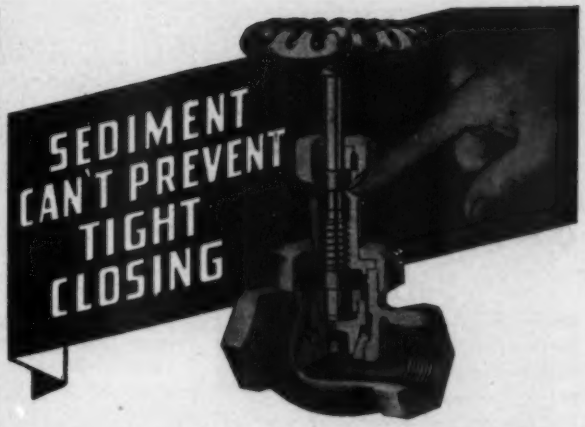

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single plate depending upon the desired size of the images. Both the specimen and the camera chambers may be shut off from the rest of the microscope column, so that the specimen or plate may be changed without letting air into the entire microscope. The chambers are evacuated with an auxiliary pump before reconnection to the main vacuum system.

The advance in microscopy brought about by the introduction of the electron microscope lies in the improved resolving power of the electron compared with the optical microscope.

Useful magnifications of 50,000 to 100,000 may be obtained. The maximum magnification in the microscope itself is about 25,000 but the negatives have sufficient fine detail to warrant subsequent enlargement to yield the magnifications quoted above.

As is the case in ordinary microscopy, no definite upper limit can be set for the permissible thickness of specimens for electron microscopic examination. However, it has been found rather generally that no internal structure or differences in density can be distinguished in a specimen thicker than one micron (0.001 mm.) when the maximum accelerating voltage of the microscope is 60,000 volts, as it is in the R. C. A. instrument. The sharpest images of internal structures are generally obtained for a specimen less than 0.01μ thick and the images become progressively more diffuse as the thickness increases. This lack of sharpness in the images of thick specimens is due to the fact that too large a proportion of the electrons are slowed down in passage through the specimen. If only the outline or silhouette of the object is of interest, much thicker specimens may be used.

The restrictions on the length and width of the specimen are less severe but more definite. The field of view in the microscope is circular and less than 15μ in diameter; hence the length of the longest object which can be viewed in its entirety is somewhat less than 15μ. The maximum permissible dimension of any specimen is about 1/16 inch and is fixed by the design of the specimen holder.

The previously described need for evacuation of the microscope obviously limits the specimens to those which withstand such evacuation.

The materials which meet these requirements for satisfactory observation are many and varied. Among them are: films of plastics, resins, and other high molecular weight materials, clays, fillers, pigments, smokes, fumes, emulsions, nearly all finely divided powders, biological structures, and many fibers.

Ideally, the specimen should be self-supporting so that the electron beam need pass through nothing but the specimen. However, most specimens must be supported on a homogeneous film which shows no structure and which is so thin that the electron beam is only slightly reduced in intensity by passage through it. Yet this film, which in turn is supported on a 200-mesh screen, must be strong enough to support its own weight and the weight of the specimen. It must also withstand the surface tension effects which act upon it

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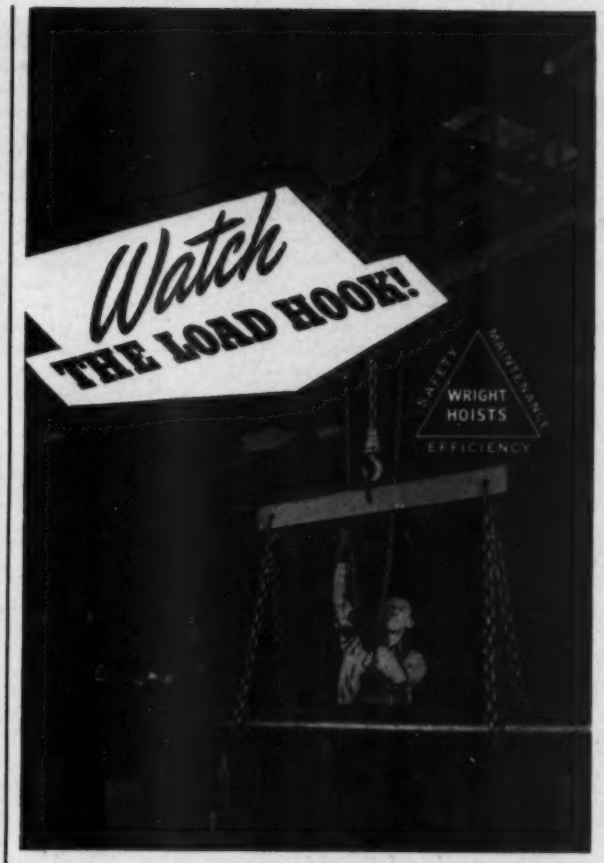

★ In one of their recent bulletins on hoists, the National Safety Council says:

"Hooks which have become bent on account of overloading should not be straightened and put back in service, but a new hook should be provided. When a hook is once bent the stress in the metal tends to weaken it so that afterward its strength is a matter of doubt and cannot be depended upon."

That's good advice. With the lives of American boys utterly dependent upon our industrial production, this is no time to take chances which may cause lost time accidents to men or machines, or both.

Watch the Hooks. Wright load hooks are drop-forged from special steel which, when subjected to excessive overloading, give visible warning by opening slowly. When the bottom hook has started to open, look to the top hook, too, for while it is stronger than the bottom hook, it also may be reaching a danger point.

Don't Abuse Your Hoist. Now that we are all faced with restrictions and shortages proper maintenance is of paramount importance. While every WRIGHT HOIST is built with load-carrying factors considerably in excess of their rated capacities, like many other well-made pieces of mechanical equipment built for specific duty, they should not be overloaded. Overloading is dangerous—to men, materials, machinery and steady production. Remember—abuse to machinery today is akin to sabotage. Conserve steel and maintain production schedules by careful use, regular inspection and proper lubrication.

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during the preparation of the specimen and the effects of the electron bombardment it undergoes during examination of the specimen.

These supporting films are often made of collodion. A drop of a dilute solution (about 2 per cent of collodion in amyl acetate) is placed on the surface of distilled water, when it instantly spreads into a thin film. After the solvent has evaporated, a still thinner film of nitrocellulose is left. One of the ⅛-inch disks of 200-mesh metal screen is covered with a piece of this film and the mount is then ready for the specimen.

If the material to be examined can be suspended in water or some other liquid which does not soften the nitrocellulose film, a drop of the suspension is placed on the film-covered disk and allowed to dry. The specimen is then ready to be placed in the microscope for observation.

The R. C. A. electron microscope is not adaptable to the examination of solid surfaces—i. e., objects cannot be examined by reflection of the electron beam in analogy to the examination of surfaces in the optical microscope by reflected light. However, an ingenious technique for examining such surfaces has recently been described by Zworykin and Ramberg (Zworykin, V. K., and Ramberg, E. G. Surface studies with the electron microscope. *J. Applied Physics* 12, No. 9:692-95, Sept., 1941).

At present there is no "staining" technique for electron microscopic specimens. The equivalents of the stains of optical microscopy are conceivable and may well be a future development.

The interpretation of observations made with the electron microscope must be made with even more care than in the case of observations made with the optical microscope. The field of view is small and only a minute quantity of material is seen at one time.

Whole fibers are too large to be seen in their entirety but the finer fractions of a stock and the contours of the larger fibers can be examined. The most interesting observation up to this time is the existence of fine fibrils on the fibers and fiber fragments of all stocks that have been examined.

The extreme physical mistreatment received by a glassine pulp is evident in electron microscopic observations. Relatively few fibers are found which are completely opaque to the electron beam and the larger fibers appear macerated and striated.

Groundwood is a particularly interesting material because of the diversity of the forms seen.

It might be expected that rag stock would show an extensive development of subfibrils; and that is the case.

The study of dyeing with pigment dyes is an interesting field for the electron microscope. Because of the difficulty of observing whole fibers the relative distribution of dye particles over the fiber is not certain, but there seems to be a tendency for the particles to concentrate in the fibrillated portions of the fiber. However, even in a deeply dyed stock the fibrous material is by no means covered by or even densely spotted with pigment particles. The presence of size particles on the dyed articles is noteworthy.

The study of clays and fillers is definitely valuable, particularly so with regard to the effects of processing variables and special treatments. Changes in particle size and shape, and such changes in surface as can be inferred from changes in the outline of the particle, may be easily followed.

Electron microscopic observations should be of help in differentiating between the contributions of particle size and particle shape to surface area. Both size and shape, through surface area, are related to such practical problems as the amount of binder used in coating compositions.

Studies of characteristic shapes and structures of bacteria by means of the electron microscope may provide assistance in the tedious and difficult problem of identifying bacteria.

These few subjects by no means exhaust the possible fields of application of the electron microscope in the paper industry. Among the more obvious of the others are: the examination of wood fibers before and after various stages and types of cooking; the observation of the retention of fillers by fibers sized by different agents; the study of the interaction of fibers and adhesives, impregnants, and inks; and a search for characteristic behavior of various papermaking fibers during the steps of stock preparation with the aim of aiding in the explanation of their subsequent behavior and properties.

In conclusion, it might be pointed out that although the electron microscope is a fascinating instrument, it, like the optical microscope and many other laboratory instruments, should not be considered a field of research in itself but as a tool to be used with other tools and other laboratory methods to gather information and data which may be used both directly and indirectly in the solution of practical papermaking problems.

Control of Direct-Heated Sulphite Digesters

JOHN F. INDERDOHNEN, Engineer
The Bristol Company

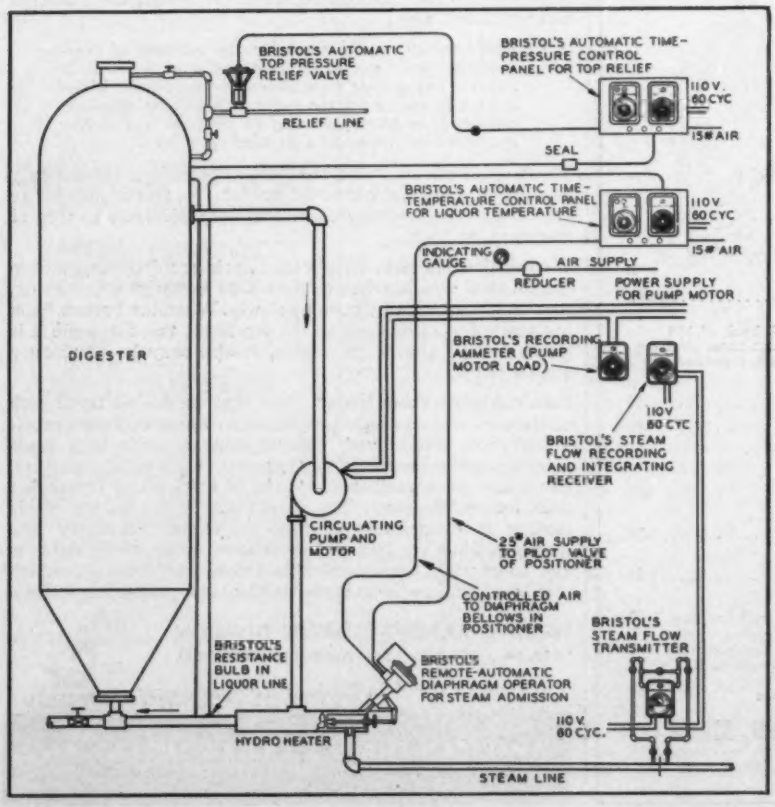
In an earlier paper (A Time-Temperature Control for Sulphite Digesters, presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, Feb. 19-22, 1940) we dealt with a resistance thermometer potentiometer time-temperature control applicable to sulphite digesters with circulating systems for the liquor.

The present paper will deal with installation data and operating results based largely on experience at the Great Lakes Paper Company sulphite mill at Fort William, Ontario.

Figure 5 (at left) diagrammatically illustrates the installations, the relations and functions of the equipment involved in a complete direct heated circulating system for sulphite digesters.

The operating results of such control systems are shown by the series of chart records from the recorders used on this installation.

Figure 6 is a record made by the Pyromaster resistance thermometer time-temperature reset air controller actuating the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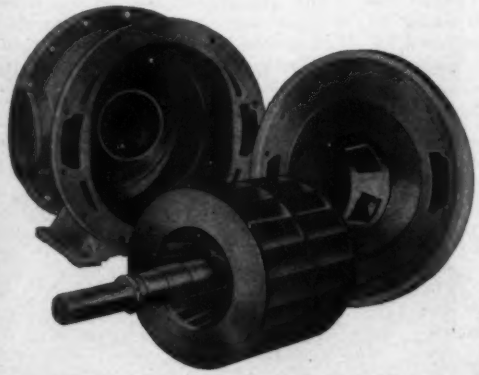

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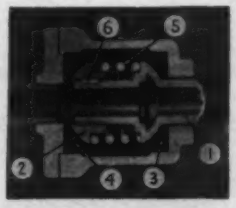

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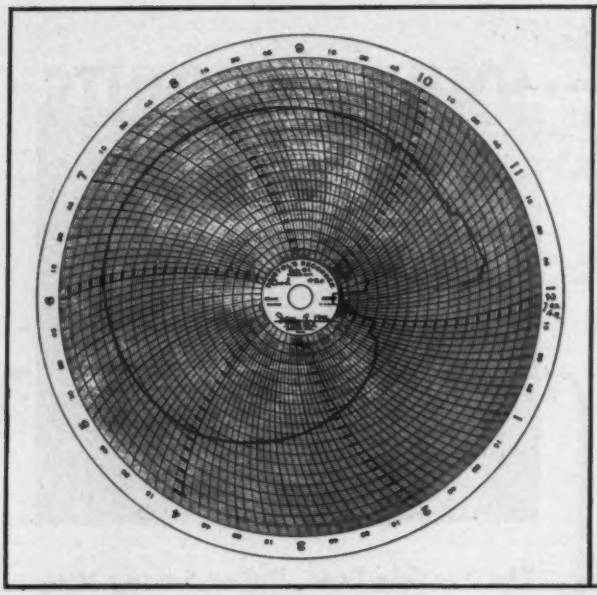


Figure 6

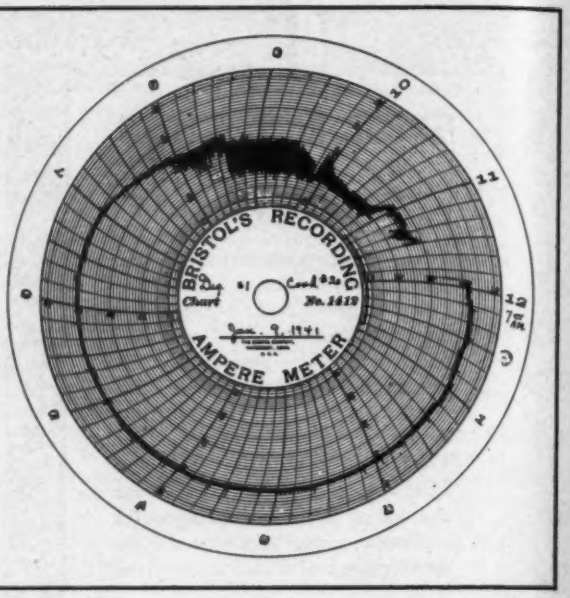


Figure 7

valve positioner and synchro-air motor on the Hydroheater. The controller cam duplicates the chart itself on a metal disk. It is cut to the control curve desired, and has adjustments for slightly altering the settings without cutting new cams.

The temperature in this case was smoothly brought up to 130 C. in six and one-quarter hours, held one and one-quarter hours, and then the steam supply to the digester was shut off manually. This is apparent from the record.

Figure 7, the ammeter chart, notes a falling off of power in the pump circuit after seven and a half hours of operation. This indicates enough pulping at the collector ring to cause the pump to draw the liquor through in slugs. Just before eight hours of operation the chart indicates this slugging of liquor has become rapid enough to upset further temperature controller action based on the bulb in the circulated liquor line.

Incidentally, a switchover could be made, either manually or automatically to another resistance bulb or other electric temperature sensing element placed directly in the digester if such a feature were desired.

Figure 8 shows how good chip distribution and circulation give uniform temperatures in different parts of the digester. These records are of the top and bottom temperatures of the digester. Notice how these record lines stay together during the heating up period to 113 C. and then follow uniformly within a few degrees of each other.

Figure 9 shows the control of digester pressures effected by the time-pressure ampliset free vane air-operated controller and the synchro-air motor valve in the relief line. The valve body is of KA2SMo, double seated, with a ratio plug to give graduated action.

The time-pressure cam is cut to give the desired control curve and the chart record (Figure 9) shows how well the pressure curve was maintained.

Checking the steam flow curve on this chart against the temperature curves on charts Figures 6 and 8 indicates in reverse the difficulty involved in maintaining a correct digester temperature curve based on automatic control of steam flow to the digester. This flow curve is quite variable, yet the temperature curves are uniformly those required.

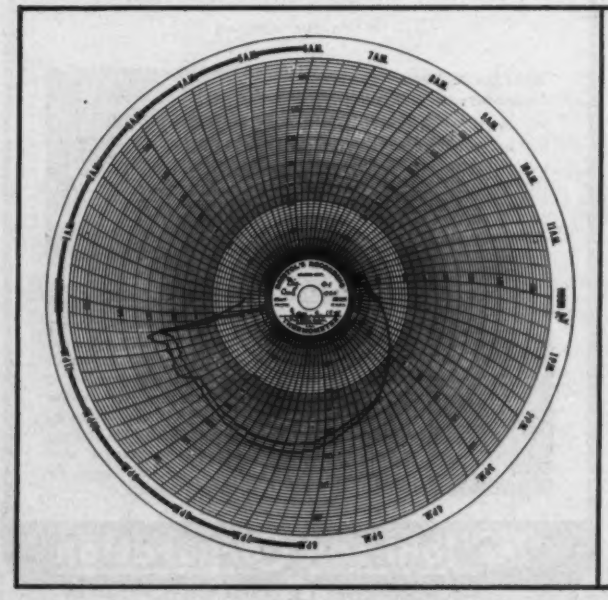


Figure 8

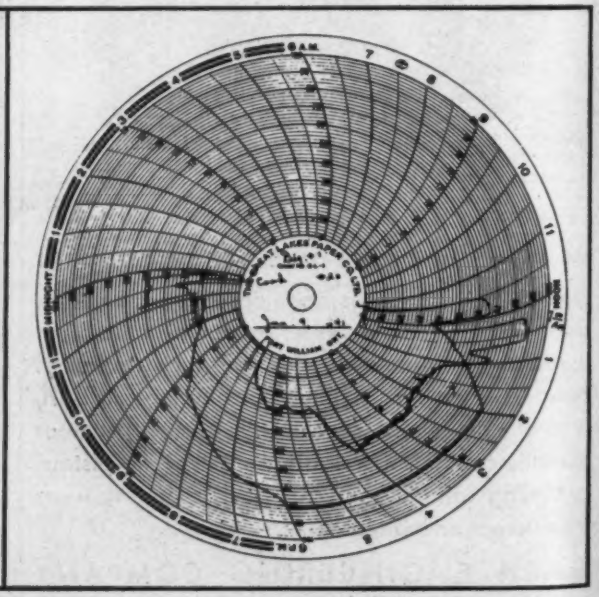
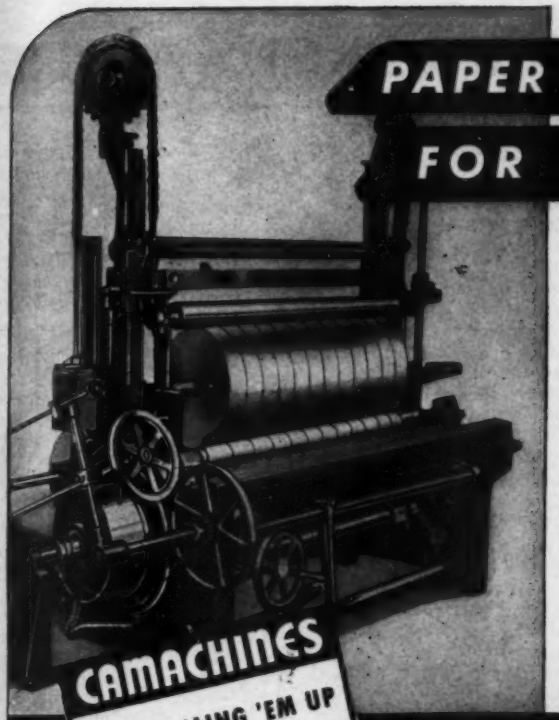


Figure 9



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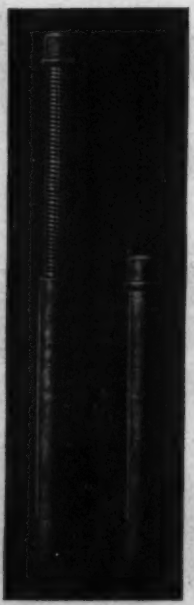
Carbon Dioxide Fire-Fighting Engine

American-LaFrance-Foamite Corp., Elmira, N. Y., has announced a 100 lb. carbon dioxide fire-fighting engine. Approved by Underwriters' and Associated Factory Mutual Laboratories for use on both electrical

and oil fires, the engine, designated as the *New Alfite*, smothers fire instantly with carbon dioxide gas. This gas expands upon discharge to 450 times its stored volume. Design features include: a horn to protect operator from static charge, perfect balance at wheeling height, and easy maneuverability.

Coal Pile Temperature Indicator

Coal Specialties Co., 50 Church St., New York City, has announced an automatic signal device for use in soft coal piles to warn of dangerous coal temperatures before coal starts to burn. Known as the *Hot Spot Indicator*, the device consists of a 15 ft. steel casing, capped at the top and threaded at the bottom for a fluted bronze tip for thrusting into the coal. Inside the casing is a chain of seven fusible links which are spaced about two feet apart and held under tension of a strong spring. Each fuse blows at 150 Fahr. When a link so parts, the tension breaks and another spring forces up a plunger carrying the top cap, thus warning of a dangerous coal temperature. A single indicator simultaneously watches temperatures within a horizontal radius of ten feet and at seven different levels. Replacement of blown fuses and periodic painting are the only items of maintenance suggested by the supplier.



Photoelectric Reflection Meter

Photovolt Corp., 95 Madison Ave., New York City, has announced a new photoelectric reflection meter for testing paper for opacity and brightness.

A search unit, comprising the light source and the photocell, is connected to the instrument proper by cable. In use, this unit is placed on the paper to be tested. For whiteness measurements, it is first placed on the standard (magnesium oxide) in terms of which the readings are to be taken and the needle set on 100. Then, when the unit is placed on the paper, the needle indicates brightness directly. In making opacity tests, the paper is placed on a black and on a white backing, the opacity being obtained as the ratio of the apparent reflectance with white backing to the one with black backing.

The instrument is furnished in two models. One model operates from dry cell batteries housed in the instrument casing; the other, from the power line. The line-operated model comprises controls which enable the operator to set the instrument on zero for a "dark standard." The scale

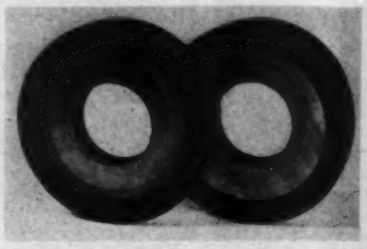
of the instrument, then, covers the range from light standard to dark standard, so that minute differences in shade are registered by wide needle indications.

Three color filters (red, green, and blue) are supplied with each instrument. By using one of these filters, properly selected for the shade of paper to be tested, differences hardly perceptible to the human eye can be registered; while data characterizing the color of the paper are supplied by the use of two or three of the filters.

The instrument is built in a portable housing with cover and carrying strap. The line-operated model can be furnished with a special search unit for measuring specular gloss of paper.

Rubber-Covered Press Roll

B. F. Goodrich Co., Akron, Ohio, has announced the development of a Vulcalock-processed, rubber-covered press roll with steel-jacketed core. The jacket consists of two accurately formed steel sheets which are welded longitudinally so that they shrink around and practically form an integral part of the core. Before putting on the jacket, the core is prepared to receive it. If it is of a roll being recovered, all traces of the old cover are first removed on a lathe. Then angular grooves, approximately ½ in. wide and ⅛ in. deep, are cut in the surface approximately an inch from each end for venting of gases which form in the core during vulcanization of the rubber. Each of the grooves has two ⅛ in. holes, spaced 180 degrees apart, which connect the vent grooves with circulation port holes in each head.



The two steel sheets from which the jacket is formed are slightly longer than the core face but are turned off to the same length when welding is completed.

After the welded seam is ground to eliminate the raised bead, the jacket surface is cleaned thoroughly by shot-blasting and the Vulcalock cements applied, sufficient time being given to allow the solvents to escape, and then the rubber covering put into place.

This new roll has the same amount of cushion rubber as a roll of other construction, yet saves about 25 per cent in the rubber needed for covering through the elimination of the hard rubber base.

The manufacturer claims for this roll: absolute bond between rubber and metal, closer control of vulcanization time and temperature, uniform density, no cotton venting strings to possibly produce corrugations, more usable cushion rubber—thus longer life.

Electric Tractor

An electric tractor, designated as *Model "NTTD,"* has been announced by the Crescent Truck Co., Lebanon, Pa. This tractor is powered by two heavy duty tractor drive units, including two motors.

It offers a drawbar pull of 800 lb. normal, 3600 lb. ultimate. The wheel base is 48 in.; the overall length, 84 in.; the overall height, 59 in.

Travel is controlled by a lever-operated drum-type controller, which is interlocked

On the paper mill salvage front, the Bauer double-disc pulper is a prime weapon of waste stock conversion. Kraft knotter and screen rejects, groundwood screenings, and other waste paper materials are turned into A-1 pulp by this fast and economical pulper. We are proud to be the builders of equipment so important to the vital business of waste product salvage. *THE BAUER BROS. CO., Springfield, Ohio.*

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automatically with the operator's seat and brake foot pedal. If controller is left in any speed position, handle must be brought to neutral, with brake released and operator seated, before power can be applied. Battery compartment can be provided for either side or top removal of battery.

Spray-Making Attachment for Fire Extinguishers

Pyrene Mfg. Co., 560 Belmont Ave., Newark, N. J., has developed a device, the *Thumb-spray*, for clamping over the ⅜ in. hose and nozzle of any standard soda-acid, foam, gas cartridge or pump tank fire extinguisher to convert its otherwise normally solid stream into a spray. Made of spring steel, the device functions by simply applying pressure with the thumb at its unattached end.

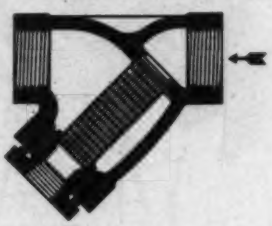
Present extinguisher equipment, according to the manufacturer, may be made more effective on certain fires and may be adapted for use on the common magnesium incendiary bomb by the use of the attachment.

Tight-End Conveyor Pulley

The American Pulley Co., 4200 Wissahickon Ave., Philadelphia, has announced the development of its *Type "N"* pulley which is made with tight ends and of rolled steel. The pulley is made in diameters from 6 to 36 in. It is equipped with removable, interchangeable hubs.

Pipe Line Strainer

Yarnall-Waring Co., Chestnut Hill, Philadelphia, has announced a fine screen strainer for installation in any pipe line, either horizontal or vertical. The strainer is made in six standard sizes, ½ in. to 2 in., and in iron body for pressures up to 250 lb., steel body for pressures up to 600 lb. It also is available both in screwed type and in flanged end design. Features cited by the manufacturer for the strainer include: (1) plating inside and outside for protection against rusting; (2) screen of Monel woven wire fine enough for straining service but having ample free area; and (3) straight thread and machined face on blow-off bushing for easy removal and replacement of screen and for tight joint.



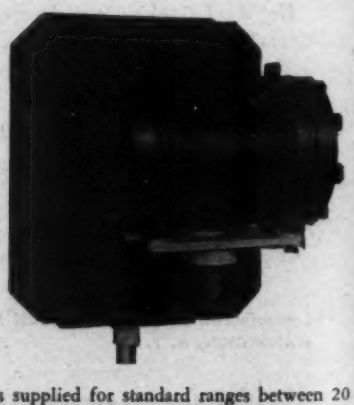
Tablets for *p*H Tests

R. P. Cargille, 118 Liberty St., New York City, has announced the development of a set of 17 tablets, which, when dissolved as directed, provide 17 solutions of known *p*H value. A vial fitted with applicator rod is furnished for each solution.

The set has been designed to increase the accuracy of *p*H tests made with test paper. Solutions of known *p*H, applied to the test paper, bring out on the paper the color for any half unit from a *p*H of 3 to a *p*H of 11, readings being made to one-half *p*H unit. The colors are used for reference to judge the *p*H of the sample being tested.

Aneroid Manometer

Taylor Instrument Companies, Rochester, N. Y., has developed an aneroid manometer for flow or liquid level, so designed that a torque type assembly gives a completely closed system, while metal bellows, built to withstand high over-range without damage, respond to the pressure variations. Under steady flow conditions, the manometer, according to the manufacturer, is accurate within one per cent of scale range. It is available for all types of indicating and recording meters and controllers and is supplied for standard ranges between 20 and 500 in. of water. The range can be changed on the job by substituting precalibrated torque tubes.



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KNIVES MUST LAST LONGER

The Rogers CC-3 Cabinet Base Grinder enables you to have a continuous supply of *keen cutting edges* . . . with *minimum removal of metal.* Easy to operate,—it is invaluable in sharpening top and bottom slitters, double bevel slitters, splitting knives, circular knives, circle and ring shear knives.

Make your knives last longer! The CC-3 grinder has proved its ECONOMY in hundreds of plants and mills. Send for Bulletin CC.

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ROGERS KNIFE GRINDERS
PRECISION QUALITY SINCE 1887

The COLEMAN GLASS ELECTRODE pH TESTER
gives you *pH Control of Your Whitewater*

Check these advantages
Proved in many paper mills—

- Uniformity of sheet
- Perfect printing surfaces
- Better finish
- Strengthens folding quality
- Insures sheet permanency

The Coleman pH Tester, or better, the Coleman Electrometer, are proven tools for controlling pH at the beater or headbox. Manually operated, speedy tests are usually made every 15 to 30 minutes for close regulation of alum. The pH of the whitewater does not change rapidly enough to warrant continuous pH readings.

The pH Tester at $98.50 or Electrometer at $180.00 will return many times their cost in saved batches.

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Write for Bulletin PI-1042 today.

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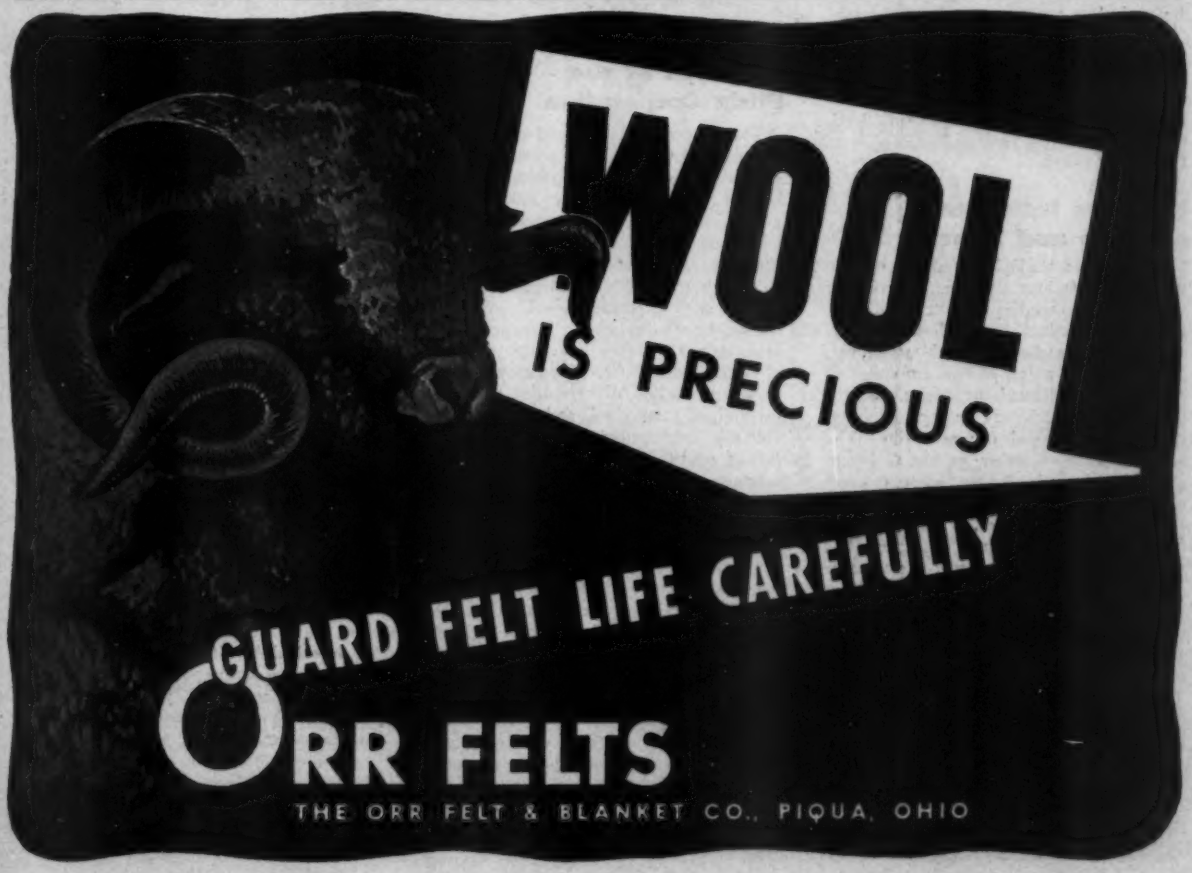

TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Hemicelluloses of Cottonwood

(The following brief abstract is given, since any knowledge of the chemistry of woods used in the pulp industry are to be welcomed.) After the extraction of wood with acetone, hot ethanol, and hot water, the aqueous extract no longer gave a test for starch (with iodine). Anderson's usual technique was then used for isolating hemicelluloses and pectic materials both before and after chlorination. The hemicelluloses appear to be a mixture of molecules containing chains holding 7 to 9 xylose units for each methoxyhexuronic acid unit. Before chlorination, the hemicellulose fractions responded positively to the blue iodine test—but whether this was due to traces of adhering starch or whether to the structure of the hemicelluloses themselves is not clear. In any event, these fractions on hydrolysis yield small amounts of glucose, as well as xylose, and a methoxyhexuronic acid coupled with two xylose units. The optical rotation was strongly negative, and the equivalent weights varied (in the case of the hemicelluloses) from about 1000 to 1400. The small amounts of pectic material isolated had the properties of pectic acid. It amounted to only 1.5% of the weight of the wood. E. Anderson, R. B. Kaster, and M. G. Seeley. J. Biol. Chem. 144, 767 (1942).

Frost, Its Influence on Pulp and Paper

The authors studied the effects of low temperature (minus 25 deg. C.) on the strength and properties of cotton and linen pulps, hardwood pulps (beech and aspen), straw pulp, bleached and unbleached sulphite and kraft pulps, and on groundwood. They also investigated the effects on writing paper, parchment paper, blotting, spinning paper, and on newsprint. The effect of frost—whether or not it is appreciable—depends largely on the water content of the sample under examination. When this water content is that ordinarily found in air dried papers or pulps (less than 12%), the effects are rather slight; hence from a practical standpoint they can often be ignored. However, as the water content rises, the effect becomes far more important, and different pulp and paper samples show individual differences. The changes seem to be due to the freezing of water in the capillaries. At low temperatures, sorbed water does not appear to freeze. With higher water content—that is, with wet pulps, the changes that occur usually are manifested during the first few days after exposure to minus 25 deg., and protracted exposure does not increase the effect, which may however be accentuated by alternate thawing and freezing.

When frost plays a role, it causes a decrease in degrees Schopper-Riegler. To attain a similar degree of beating, frozen stock required longer beating periods. Test sheets from such stock often showed a diminution in bursting strength and in folding endurance (or bending endurance) over that of the same stock that had not been frozen. Test sheets from frozen stock were bulkier, and they required more size to render them impervious to ink. When the water content of the pulps reached 80%, marked differences became apparent. Bleached soft pulps showed the greatest changes on exposure to cold. The sample of beechwood pulp examined by the authors was extremely sensitive and showed great decreases in bending endurance and in burst. The latter dropped to about one-half that of the original, unexposed pulp. Absorptivity increased. Imperviousness decreased.

Most of the other pulps showed a similar qualitative behavior, but one unbleached sulphate pulp was extremely frost-resistant and showed little change. A groundwood sample showed a marked increase in weight/unit volume and in slowness, and actually became more impervious after frost treatment. While the various paper samples showed few changes on exposure to low temperature, their moisture content increased. This was especially true of a blotting paper. Whatever other changes were noted could be ascribed to this change in moisture content. An individual spinning paper, after exposure to cold, showed a slight increase in bursting strength and folding endurance. W. Brecht and A. Prydz. Papier-Fabr. 39, 201-7, 209-16 (1941).

Polarographic Analysis Applied to the Paper Industry

The author discusses the fundamentals of polarography and its possible use in instituting industrial control. Special reference is made to the instrument which is shown in an illustration. It consists in part of a dropping mercury electrode and a means of permanently recording the polarogram. Its suggested uses are: the quantitative analysis of small amounts of pulp ash; the study of cations in pulping liquors; in the determination of iron in papermakers alum; in the analysis of alloys; for the determination of oxygen in boiler feed waters, and in making studies of the reduction potentials of organic compounds. This is the third paper in a series on physicochemical methods used as controls in the pulp and paper industry. K. Schwabe. Papier-Fabr. 39, 241-6 (1941).

Research of the Phrix Corporation

The work of the plant and its associated research institute involves a series of steps in what is essentially one problem—the conversion of the cellulosic raw material (wood, straw, or other natural products) into high alpha dissolving pulps, with as complete as possible a utilization of the entire raw material. The natural substances are given a preliminary acid hydrolysis, before the alkaline cook. The first article deals largely with the industrial utilization of these hydrolyzates. They may be used in the production of crystalline xylose, of furfural, of cattle feed, and of acetic acid, but the most promising of them all is that of yeast formation. If suitable inorganic nitrogen compounds were used as nutrients with *Torula utilis*, 100 parts of sugar in the hydrolyzate may be converted to 50-55 parts of yeast, which contains approximately 50% protein. The plant has the capacity of producing 20,000 tons of this material annually, and the report indicates that this is quite comparable with the commercial yeast now used for human consumption. It actually contained slightly more protein. When mixed with viscose the material can also be used in artificial fiber production.

While this communication is general, a more specific progress report is given in a subsequent paper by another author (Dörr). In this latter case reference is made specifically to rye straw which contained 49.4% cellulose and 25.45% xylan. This was pretreated with dilute sulphuric acid (varying from 0.25% to 3.0%) and with water alone as control. The optimum results were obtained with either 0.5% acid at 130 deg. C. or with 1.0% acid at 130 C. Below these temperatures the hydrolysis was too incomplete to be practicable, and above these temperatures the pulps were too highly degraded. The residual pulp was then given a sulphate digestion for a brief time period, and the resulting pulp contained about 92-93% alpha cellulose and a relatively low xylan content (1.7-6.0% depending on conditions). The degree of polymerization of the alpha cellulose was 1100 or more. It was not possible to remove all the pentosans.

This study is quite systematic and furnishes extensive data on the percentage of xylose in hydrolyzates, on the percentage of xylan removed from the pulp under varying conditions, on the degree of pulping, degrees of polymerization of the cellulose, etc. Prehydrolyzed straw pulp may be bleached by the usual techniques, but the chlorine consumption is lower. A concommitant result of prehydrolysis is a decrease in stream pollution. Methods similar to those given for rye straw have been used, in slightly modified form, for spruce, pine, beech, and potato tops. H. Jentgen. Papier-Fabr. 39, 257-62 (1941); and Dörr and co-workers. Papier-Fabr. 39, 267-73 (1941).

IMPROVED PAPER MACHINERY CORPORATION

NASHUA, NEW HAMPSHIRE

CONTINUOUS ROTARY VACUUM FILTERS, including:

Black Liquor (Brown Stock) Counter-Current Washers

Bleached Stock Washers

Sheet Forming Machines

Sludge Filters

Save-alls

Special Purpose Filters

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OPEN CYLINDER MACHINES, including:

Deckers (Single or Double End)

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CENTRIFUGAL PULP SCREENS

BLEACHING EQUIPMENT (THORNE)

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TRAVELLING SHOWERS (With Hydraulically Operated Oscillating Nozzles)

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LABORATORY OR PILOT PLANT EQUIPMENT, including:

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SPECIAL MACHINERY

Also auxiliary equipment including Shredders, Re-pulpers, Mixers, Stock Volume-Metering Devices, Bellmer Agitators, etc.

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— USE QUALITY MATERIALS
To get the most out of your packings, gaskets and oil seals, insist on *quality* at the start... and be sure you use the proper material for each requirement. A Garlock representative will gladly advise you about this.
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New Catalogues, Ass'n Reports, and Publications

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—This company has recently released two new bulletins, No. B6059-H and No. B6052-C. B6059-H contains a compact compilation of facts on the centrifugal pump line. The variety of emergency wartime applications has been kept in mind in preparing this book. Construction features, sizes, and capacities are listed. Pump types for every purpose—single and double suction, single and multi-stage mixed, and axial flow, combined Allis-Chalmers units and special pumps to solve special problems are included. Bulletin B6052-C gives facts necessary for quickly choosing correct motors for wartime applications. Compact, simplified charts permit the reader to determine all electrical and mechanical characteristics of the motor types designed for each specific application. In addition, construction features of various Allis-Chalmers Lo-Maintenance Motors are completely described, and numerous typical applications are illustrated. Copies of both bulletins are available upon request.

Crane Co., Chicago—"How to Repair Valves" is the title of a new bulletin on piping pointers (No. 5 in a series) just issued by this company. It explains and illustrates the various steps to take in repairing leaky gate and globe valves, as well as hints on how to reclaim discarded valves. Aimed to enable users to get better and longer service by keeping valves in good operating condition, this bulletin is especially timely in these days of maximum industrial production when valves, like other piping materials, are not always easy to obtain.

DeLaval Steam Turbine Co., Trenton, N. J.—Two-stage centrifugal pumps of the opposed impeller design are described in a 12-page catalogue (B-3) recently published by this company. This type of pump is comprehensively described and illustrated in this publication. A diagrammatic cross-section of the pump is also included. This type of pump is listed for capacities from 50 gallons per minute to 1,500 gallons per minute, and for heads from 80 feet to 800 feet.

Eagle Printing Ink Company, Div. General Printing Ink Corp., New York City—The Color Research Laboratory of this company has released the tenth folder in the Color Facts Series. A colorful folder prepared for the amusement and enlightenment of its readers, it presents a number of optical illusions which prove that seeing is not always believing. Some of these optical illusions concern the mechanism of the eye and others concern the brain. Entitled "Color Illusions and Magic," it is available upon request to the company.

The B. F. Goodrich Co., Akron, Ohio—This company has recently announced as available to those interested a new booklet, "Rubber Conservation for Users of Industrial Rubber Belting." One of the principal features of the booklet is an illustrated step-by-step procedure for making repairs on conveyor belts by the use of portable electric vulcanizers. Built around the general theme of saving rubber in the plant, the material is found under such sub-headings as "Rubber Can Be Saved by Making Vulcanized Repairs Promptly," "Rubber Can Be Saved by Salvaging Belts for Smaller Drives," "Rubber Can Be Saved by the Plylock Splice," and "Rubber Can Be Saved by Proper Care." Interesting samples of savings already made and valuable rubber conserved are given. These include the saving of two tons of rubber in a large conveyor belt by making vulcanized repairs and the cutting down of old belts and by removing worn plies, changing them into belts for smaller drives.

Hercules Powder Company, Wilmington, Del.—The Naval Stores Department of this chemical firm has prepared a new 8-page booklet discussing Staybelite Resin, the hydrogenated rosin produced by Hercules from southern pine. Physical and chemical properties of Staybelite are set forth in the analysis of a typical sample, and major properties are also discussed generally. Certain solvents and plasticizers for Staybelite Resin are cited. Also presented are graphs indicating the rate of oxygen absorption of Staybelite as compared with the rate for WW gum rosin and N wood resin, and indicating the oxygen demand of regular rosin size versus Staybelite size. Among the applicatioss for Staybelite are discussed its use in adhesives, rubber compounding, resin manufacture, rubber reclaiming, the electrical industry, paper size, paper converting, greases and lubricants, ceramics, soaps, and metallic resinates.

D. O. James Mfg. Co., Chicago—A new permanent record catalogue has recently been compiled by this company. It contains 400 pages of illustrations and engineering data, covering application, examples of use, horsepower ratings, and dimensions of every type of speed reducer. This catalogue (No. 1000) is available upon request.

Roller-Smith Co., Bethlehem, Pa.—Roller-Smith's line of 3 and 4 inch panel instruments is described in detail in a new catalogue. In addition to a complete listing and prices, the various types of cases are illustrated, dimensions and listings of a complete line of shunts are given and RT current transformers for ratios up to 500/5 are illustrated and described. Dimensions and mounting details on all standard panel instruments are shown, and a map indicates the location of the nearest Roller-Smith representative from whom information can be secured, if necessary. Copies of this catalogue (No. 4120) are available.

Towmotor Co., Cleveland, Ohio—This company has just issued a new manual entitled "The Inside Story of Towmotor." It is divided into six complete chapters, each of which gives thorough, authoritative treatment to factors in each individual section and interprets their role in the over-all performance picture. The subjects are Design, Frame Construction, Lifting and Stacking Mechanism, Power Plant and Travel Mechanism, Operating and Control Mechanism, and Servicing and Maintenance Features. Written simply, and well illustrated with diagrams and photographs, the manual translates basic engineering principles of functional lift-truck construction into simple, understandable terms. The book was developed by the Howard Swink Advertising Agency, Marion, Ohio, in collaboration with sales and engineering departments of Towmotor Company. Copies are available.

Books

Industrial Chemistry (Fourth Edition)—This volume by Emil Raymond Riegel, Ph.D., professor of industrial chemistry, University of Buffalo, incorporates a number of changes in the text of the preceding edition. Two chapters have been rewritten; namely, Paper and Pulp and Synthetic Textile Fibers. The chapter on Portland Cement has been brought up to date. The new developments in synthetic rubbers, as well as the advances in working natural rubber, are included in the chapter on Rubber. Likewise, several innovations in the technology of petroleum are treated in the chapter on Petroleum and Its Products. Other changes, although individually smaller in scope, are numerous and enter into the various chapters.

The book, in general, follows the scheme of the third edition. It totals 861 pages, is made up of 50 chapters, is profuse with illustrations, and is bound attractively and durably in stiff, green cloth cover with backbone printing in gold.

Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y., is the publisher; the price, $5.50 a copy.

New Commercial Technical Dictionary (Spanish - English; English - Spanish) — Compiled by Antonio Perol Guerrero, industrial engineer, this dictionary contains approximately 50,000 words which are used in electrical, mechanical, chemical, and marine engineering, as well as in radio, mining, textile, and other industries. It is a volume of 600 pages, thumb indexed, and cloth bound in Morocco finish. The price of the book is $10.00 a copy; the publisher, Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y.

Labor Arbitration — "This volume," states the author, John A. Lapp, LL.D., in his introduction, "has been written to give, in brief compass and in practical terms, an outline of the principles and procedure of labor arbitration." It is a work of approximately 250 pages, divided into nine chapters and a very extensive appendix. The titles of the chapters are: The Field of Arbitration, Types of Labor Cases, The Law of Arbitration, The Arbitration Tribunal, The Organization of an Arbitration, Procedure, Preparing the Case, The Award, and The Arbitrator's Responsibility. Provisions of collective bargaining contracts relating to grievances and arbitration are covered in the appendix. Durably bound in a stiff cloth cover, the book is priced at $3.50 a copy, by the National Foremen's Institute, Inc., Deep River, Conn., its publisher.

Breaking the Skilled Labor Bottleneck—Eugene J. Benge, management engineer, is the author of this brief, attractive, cloth-covered volume. Written from practical experience, the book is intended as a manual of procedure for foremen, supervisors, job setters, and vocational instructors. Broadly, the book is divided into two parts; namely, The Nature of Skill and Overcoming Shortages. In the first mentioned portion, the author discusses muscular skill, sensory skills, and thinking skills; explains how skill is acquired; and relates how to analyze skill. The second part of the book takes up four ways of overcoming shortages—Selection, Training, Motivation, and Supervision. An appendix includes some tabular material on the time required to learn various jobs. National Foremen's Institute, Inc., Deep River, Conn., is the publisher; the price, $2.00 a copy.

Association Reports

All of the orders which affect the industry emanate from the OPA and WPB and clear through the office of E. W. Tinker, executive secretary of the American Paper and Pulp Association. Copies of all government orders are sent by the Association to members. Listed below are releases sent out during September by the APPA. Any correspondence with that office regarding these releases should carry identifying listing and numbers under "National Defense, Legislation and Public Affairs."

No. 196—Correction to Amendment 2 of M-93 (Wood Pulp).

No. 202—General Industrial Equipment—Amendment No. 1 to General Limitation Order L-123.

No. 203—Amendment 3 to Order P-100—Repairs, Maintenance and Operating Supplies.

No. 208—Construction L-41.

No. 209—Copper Chemicals—M-227.

No. 213—Amendment No. 4—Priorities Regulation No. 11.

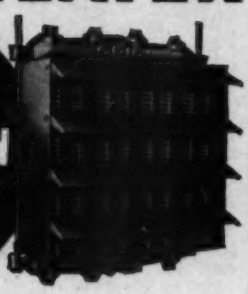
No. 214—Supplementary Order 19—Licensing Distributors of Paper and Paper Products.

No. 215 — Transportation. Certificates of War Necessity Under General Order O.D.T. No. 21.

IT'S STILL A *different* UNIT HEATER

Cast iron takes the place of aluminum for the heating sections, to cooperate with the war effort in using substitute materials—but it's still the ultimate in unit heater quality.

NOW made with **CAST IRON** Heating Sections



THE new Grid is engineered along the same lines as the Grid Unit which had aluminum heating sections—dependable, long life unit. A special design. Patent applied for. No corrosion — no leaks or breakdowns . . . In this new Grid Unit there is only one type metal in contact with steam or hot water. There is nothing to cause electrolysis that produces corrosion. Engineered and constructed to withstand up to 250 lb. steam pressure. Ask for details now.

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WATERBURY FELTS

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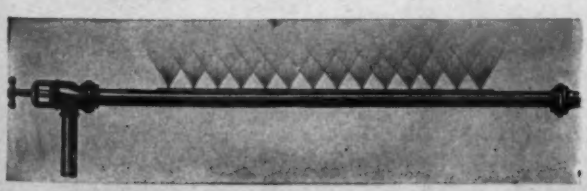
"RAINSTORM" SHOWER PIPE

More washing with less water and pressure — cleans felts and wires with less power for water pump.



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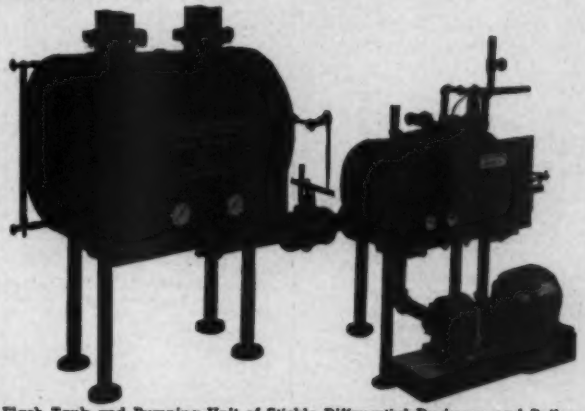
Paper Machines equipped with Stickle Drainage and Control System are producing at high efficiency and maximum economy. Designed and constructed to afford paper manufacturers advantages essential to profitable operation under competitive peace-time conditions, Stickle Equipment meets war-time demands with ease.



Flash Tank and Pumping Unit of Stickle Differential Drainage and Boiler Return System for Paper Mills.

Stickle Automatic Differential Valve.

● The complete Stickle Drainage and Control System reduces costs from boiler room to driers. It increases boiler capacity and production capacity. It increases the efficiency of machines and improves the quality of finished product.

The Stickle Differential Drainage and Pumping Unit returns condensate from paper machines to boilers or feed water heater, under pressure, at maximum temperature. Fuel cost for boilers is decreased, boiler capacity and efficiency is increased and maintenance and other costs are reduced.

The Stickle Automatic Differential Valve provides an exact differential in pressure between the two sections of paper machines, insuring proper drainage at all pressures. Efficient drainage plus ample boiler capacity enables machines to operate at maximum production volume.

The Stickle Visible Micro Adjustable Orifice supplies visibility of operation and permits accurate modulated control of operations. This, combined with Stickle Automatic Tension and Thermal Control, maintains moisture content in sheet within limits of a fractional per cent., stabilizes steam flow, saves steam and makes possible a better dried product.

Stickle Visible Micro Adjustable Orifice. Also supplied with Indicating Thermometer.

We continue our service to the paper industry in all ways permitted under present war regulations.

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RAGS (Domestic)
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NEW RAGS — *per cwt.*

Blue Overalls	5.25 to 5.50
Corduroy	2.75 to 3.00
Cottons—	
Washables, No. 1	2.75 to 3.00
Fancy Percales	4.25 to 4.50
New Soft Blacks	3.75 to 4.00
New Light Seconds	2.75 to 3.00
New Dark Seconds	2.50 to 2.75
Khaki Cuttings—	
Mixed	3.00 to 3.25
O. D.	3.50 to 3.75
New White Canvas	6.50 to 6.75
New Mixed Blacks	2.75 to 3.00
Shirt Cuttings—	
New White No. 1	6.25 to 6.50
Silesias No. 1	5.00 to 5.25
New Unbleached	6.50 to 6.75
Fancy	3.50 to 3.75
Linen Cuttings—	
White	14.00 to 14.50
Grey	13.50 to 14.00

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowances of $1 to $2 a ton depending on the value of the grade involved.

	per ton
Roofing—	
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)
ex dock New York City

NEW RAGS — *per cwt.*

Nominal
- New Dark Cuttings
- New Mixed Cuttings
- New Light Silesias
- Light Flannelettes
- Unbleached Cuttings
- New White Cuttings
- New Light Oxfords
- New Light Prints

RAGS (Foreign)
ex dock New York City

OLD RAGS — *per cwt.*

Nominal
- No. 1 White Linens
- No. 2 White Linens
- No. 3 White Linens
- No. 4 White Linens
- No. 1 White Cottons
- No. 2 White Cottons
- No. 3 White Cottons
- No. 4 White Cottons
- Extra Light Prints
- Ord. Light Prints
- Med. Light Prints
- Dutch Blue Cottons
- French Blue Cottons
- French Blue Linens
- Checks and Blues
- Linsey Garments
- Dark Cottons
- Old Shopperies

ROPE and BAGGING
f. o. b. and ex dock New York City

Gunny No. 1—	*per cwt.*
Foreign	Nominal
Domestic	4.50 to 4.75
Wool Tares—	
Light	4.00 to 4.25
Heavy	4.25 to 4.50
No. 1 Scrap Bagging	3.75 to 4.00
Manila Rope—	
Foreign	—
Domestic	*115.00-
New Burlap Cuttings	5.75 to 6.00
Jute Threads—	
Foreign (Nom.)	6.25 to 6.75
Domestic	5.50 to 6.00
Strings—	
Sisal	4.00 to 4.25
Soft Jute	4.50 to 4.75
Mixed	1.25 to 1.50

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER
F. O. B. New York City

Shavings—	*per ton*
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, Unruled	57.50-
Hard White, Ruled	50.00-
Soft White, One-Cut	57.50-
Soft White, Misc.	43.00-
Fly Leaf, No. 1	33.50-
Fly Leaf, No. 2	22.50-
Fly Leaf, Woody, No. 1	35.00-
No. 2 Mixed Col. Woody	18.00-
Mixed Colored	15.00-
Flat Stock—	
Oversizes Magazines	17.00 to 18.00
No. 1 Heavy Magazines	15.00 to 16.00
Mixed Books	9.00 to 10.00
Ledger Stock—	
No. 1 White	30.00 to 31.00
No. 1 Mixed (Colored)	25.00 to 26.00
Manilas—	
New Env. Cuttings	53.00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	37.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Colored Manila Tab Cards, Free of Ground Wood	30.00-
Ground Wood Manila Tab Cards	27.00-
Ground Wood Manila Tab Cards, Colored	20.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Bag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Cor. Cuts	35.00 to 36.00
No. 1 Old Assorted	27.00 to 28.00
News—	
White Blank	26.00 to 27.00
Oversizes	9.00 to 10.00
No. 1 Baled	8.00 to 9.00
Old Corrugated Boxes	9.00 to 10.00
New Corrugated Cuts	11.00 to 12.00
Box Board Chips	4.50 to 5.50
No. 1 Mixed Paper	4.50 to 5.50

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.50
Dry, barrels, pound	60.00 to -
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	17.00 to 18.00
80-100 mesh (bags), lb.	18.00 to 19.00
Argentine, lb.	—
China Clay—	
Domestic Filler Bulk (mine) ton	7.50 to 15.00
Domestic Coating Bulk (mine) ton	12.00 to 22.00
Imported (ship side) Bulk (lump) ton	15.00 to 26.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicia), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	18.25 to 18.75
Litharge, powd., bbl., lb.	.09 to -
Rosin (Gum)—	
New York, per 100 lbs.	
E	3.93-
F	3.96-
G	3.96-
WW	4.10-
Rosin (Wood), carlots	3.05-
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30 -
Ground and flake, drums, cwt.	2.70 -
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.05
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.10-
Pearl, barrels, cwt.	3.20-
Paper (Sp.) bags, cwt.	3.20-
barrels, cwt.	3.30-
Sulphur (crude)— (mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	15.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	.08¼ to .08½*

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OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo.:

Bleached softwood sulphite	76.00
Unbleached softwood sulphite	66.00
Bleached hardwood sulphite	73.50
Unbleached hardwood sulphite	63.50
Bleached Mitscherlich sulphite	81.00
Unbleached Mitscherlich sulphite	72.00
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Standard news print siderurus	46.00
Northern unbleached sulphate	72.00
Southern unbleached sulphate	63.50
Bleached soda pulp	66.00
Unbleached soda pulp	62.00
Ground wood pulp	46.00
Sulphite screenings	38.50
Sulphate screenings	38.00
Ground wood screenings	30.00
Northern unbleached sulphate siderurus	73.00
Southern unbleached sulphate siderurus	63.50

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Boards—	*per ton*
Binders	84.00-
Chip	37.50-
Chip, sgl. mla. lined	52.50-
Coated, white patent .016	77.50-
.020 and heavier	72.50-
Kraft liner	60.00-
News	37.50-
Book (cased)	*per cwt.*
No. 1 Coated	15.50-
No. 2 Coated	14.00-
No. 3 Coated	13.25-
No. 4 Coated	12.75-
No. 2 Offset	11.00-
A Grade Super	10.75-
B Grade Super	10.25-
Bonds (Rag Content)—	
100% Rag	*per cwt.*
Ext. No. 1	42.00 to 46.00
100% Rag	35.00 to 37.75
85% Rag	
75% Rag	26.00 to 27.00
65% Rag	
50% Rag	20.80 to 22.75
25% Rag	18.20 to 20.00
Regular Colors	1.00 cwt. extra
Bonds (Sulphite)—	*per cwt.*
No. 1	11.70-
No. 2	10.75-
No. 4	9.90-
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	*per cwt.*
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50
Ledgers (Rag Content)—	
100% Rag	*per cwt.*
Ext. No. 1	41.40 to 46.50
100% Rag	36.25 to 39.25
85% Rag	32.20 to 37.75
75% Rag	26.25 to 28.00
65% Rag	22.80 to 27.75
50% Rag	22.10 to 24.25
25% Rag	19.50 to 21.50
Regular Colors	1.00 cwt. extra
Ledgers (Sulphite)—	*per cwt.*
No. 1	13.00-
No. 2	12.05-
No. 4	11.20-
News—	*per ton*
Rolls (Contract)	50.00-
Rolls (Spot)	(nominal)
Sheets	58.00-
Tissues (Carlots)—	*per ream*
White, No. 1	1.10 to 1.20
White, No. 2	1.00-
Bleached Anti-Tarnish	1.15-
Colored	—
Anti-Tarnish Kraft	.70-
Manila	.90 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per ea.	.60-
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per ea.	.80-
Toilet, Bleached (M shts.) per ea.	5.65-
Toilet, Unbleached (M shts.) per ea.	4.25-
Towels—	*per case*
Bleached	3.20 to 3.75
Unbleached	2.80 to 3.05
Wrappings (Kraft)—	*per cwt.*
Extra Quality	5.75-
Super-Standard	5.00-
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M.F. & M.G. Waxing, 20 lb. (Carloads only)	*per cwt.* 7.25 to 7.50
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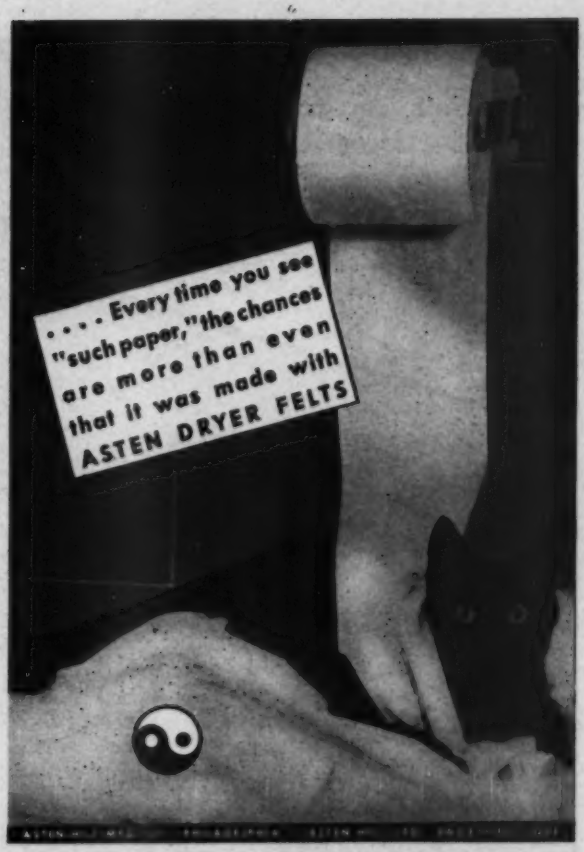

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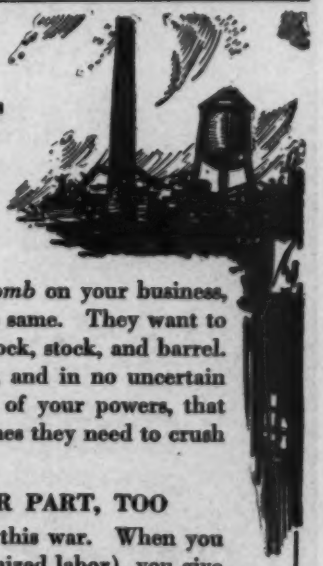

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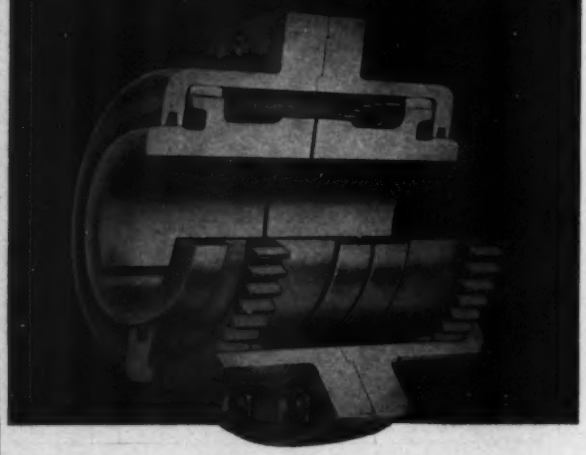

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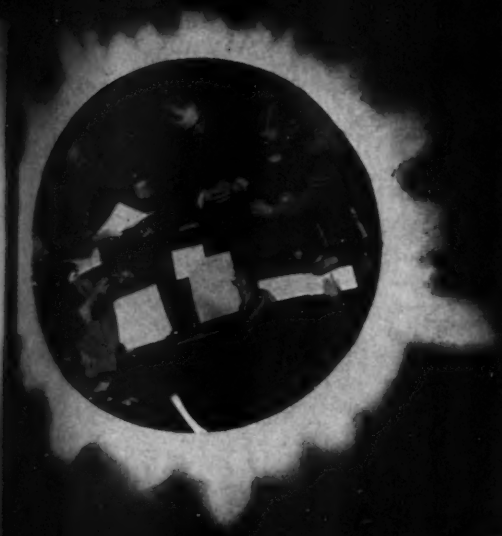

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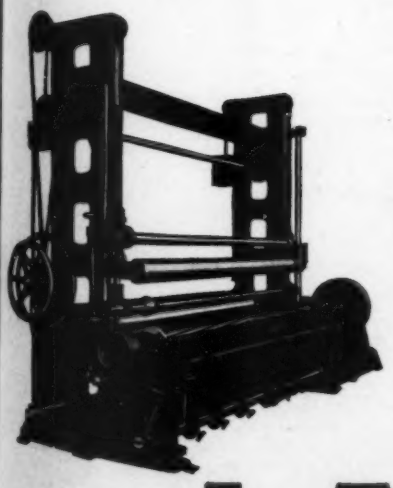

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